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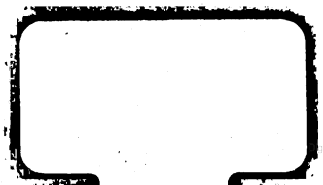
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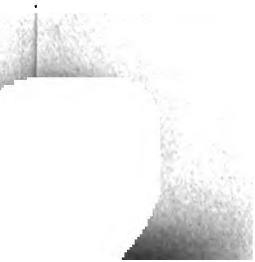
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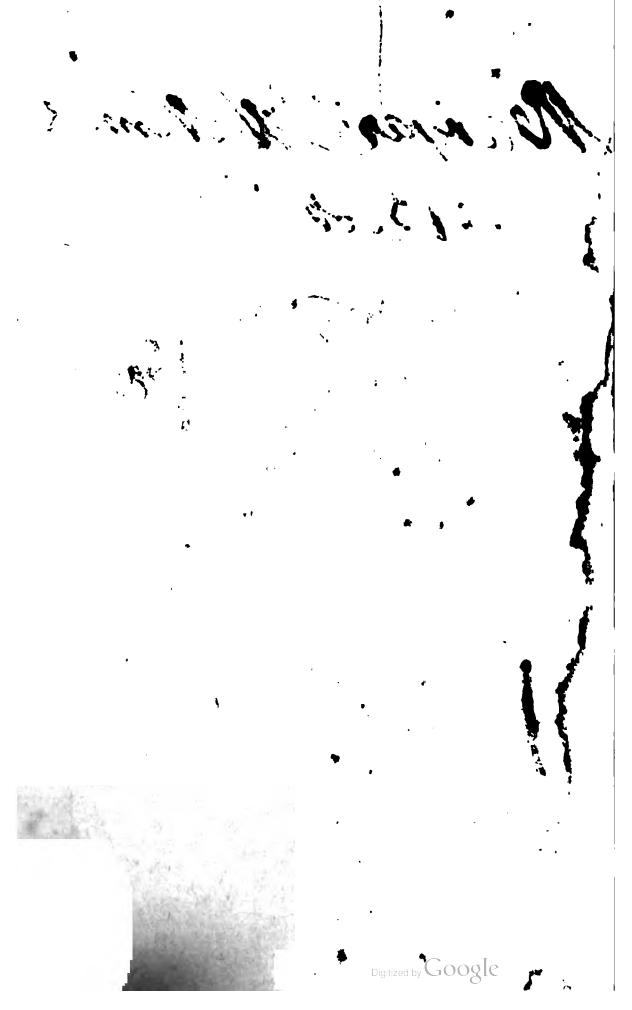
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September 27 18[illegible]

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Family

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A NEW ASSISTANT:

OR

FIRST BOOK FOR YOUTH,

WHO ARE ENTERING

ON

THE STUDY OF ARITHMETIC.

BY ISAAC COMLY.

PHILADELPHIA

PRINTED AND SOLD BY JOSEPH RAKESTRAW,
NO. 190, NORTH THIRD STREET.

1809.

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District of Pennsylvania,—to wit:

BE IT REMEMBERED, That on the seventh day of June, in the thirty third year of the Independence of the United States of America, A D. 1809, JOSEPH RAKESTRAW, of the said district. hath deposited in this Office, the title of a Book, the right whereof he claims as Proprietor, in the words following, to wit:

" A New Assistant: or first Book for Youth. who are entering on the Study of Arithmetic. By ISAAC COMLY."

In conformity to the Act of the Congress of the United States, intituled "An Act for the encouragement of Learning, by securing the copies of Maps, Charts, and Books, to the Authors and Proprietors of such copies during the times therein mentioned." And also to the Act, entitled " An Act supplementary to an Act, entitled " An Act for the encouragement of learning, by securing the copies of Maps, Charts, and Books, to the Authors and Proprietors of such copies during the time therein mentioned " and extending the benefits thereof to the Arts of designing, engraving and etching historical and other prints."

D. CALDWELL,
Clerk of the District of Pennsylvania.

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PREFACE.

THAT the young student may be furnished at half the usual expence, with a system by which he may easily acquire a knowledge of the most important rules of arithmetic, is the object of this compilation. We have endeavoured to avoid the nice and critical distinctions,—the unnecessary divisions and subdivisions, with which the science has been ingeniously overburdened, and to adhere as nearly as possible to that primitive simplicity which is adapted to the understandings of youth. We dedicate the result of our efforts to the service of those, whose situations are such as rend it expedient for them to dispense with

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material and useless forms, and to attend *only* to the acquisition of a stock of arithmetical knowledge, sufficient to answer the ordinary concerns of life; more especially, to such whose opportunity of schooling is circumscribed by narrow limits.

EXPLANATIONS OF CHARACTERS.

SIGNS.	SIGNIFICATIONS.
=	equal; as 100*cts.* = 1*dol.*
+	more; as, 8+2=10.
—	less; as, 10—2=8.
×	into, with, or multiplied by; as, 6×3=18.
÷	by (*i. e.* divided by) as, 16÷2=8; or 2)16(8,
: :: :	proportionality; as, 2 : 4 :: 7 : 14.

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ARITHMETIC.

Arithmetic is the art of computing by numbers. It has five principal rules;—numeration, addition, subtraction, multiplication, and division.

NUMERATION.

Numeration teaches to read or to write numbers.

TABLE.

Hundreds of Millions	Tens of Millions	Millions	Hund. of Thousands	Tens of Thousands	Thousands	Hundreds	Tens	Units
								1
							2	1
						3	2	1
					4	3	2	1
				5	4	3	2	1
			6	5	4	3	2	1
		7	6	5	4	3	2	1
	8	7	6	5	4	3	2	1
9	8	7	6	5	4	3	2	1

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Read the following numbers: 5,—14,—82,—100,—173,—294,—1000,—1809,—12000,—27643,—302,—654314,—8437340.

Set down the following numbers in figures.

Five.

Twenty-seven.

Eighty.

One hundred and sixteen.

Two hundred and twenty-five.

Five hundred and seventy.

One thousand eight hundred and nine.

Two thousand four hundred.

Seventy-nine thousand eight hundred and twenty.

Three millions.

Four hundred and one.

Nine hundred seventy-eight millions, seven hundred and fifty-four thousand, one hundred and twenty-three.

ADDITION.

Addition is the collecting of several numbers sum: as 3 and 2 is 5, and 1 is 6.

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RULE.

When the numbers are placed in regular order, with the right hand or unit figures under each other, add up the said right hand figures, find how many tens they come to, set down what is over, and carry one for every ten to the next column, with which proceed in the same way; and so on to the last or left hand row, under which set down its whole amount.

EXAMPLES.

425 342 234 641 1642	This example is done thus: 1 and 4 is 5, and 2 is 7, and 5 is 12: Set down 2 and carry 1. 1 carried to 4 makes 5, and 3 is 8, and 4 is 12, and 2 is 14: Set down 4, and carry 1. 1 carried to 6 makes 7, and 2 is 9, and 3 is 12, and 4 is 16: Set down 16. *Total* 1642.

3	4	34	221	431
2	5	25	442	423
1	2	43	131	335
6	11	102	794	1189

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326	261	4146	2614
812	324	2513	1365
134	173	7753	7764
772	758	14415	11743
732	413	6431	3556
434	362	4672	2234
375	704	1954	7465
564	764	4840	8574
473	128	46	4732
321	43	673	1643
345	37	2	3519
732	874	5431	2374
145	321	1126	9128
372	246	6749	7840
124	133	3826	464



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375	463	1979	31439
643	872	78	14
841	434	127	6264
723	482	8	300

374	876	7937	42433
236	6	4142	6633
743	34	738	32743
642	247	3764	1478
173	40	180	532

743	632	8432	12800
792	847	6487	6
654	976	846	43
123	345	4873	1706
804	276	427	9

Add together six, four, nine and eight.

What is the amount of 37, seventy-four eighteen, six, and 125? *Answer* 260

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One barrel of sugar weighs 340 pounds, another 408, and another 387; how many pounds do all of them weigh? *Ans.* 1135.

Add 4, sixteen, 327, eight, 43, and four thousand three hundred and twenty together.

An English Reader has 328 pages, a Scott's Lessons 340; an assistant 204, and a grammar one hundred and sixty-six; how many pages in all of them?

SUBTRACTION.

Subtraction is the taking of a less number from a greater, and shows the remainder or difference: as 3 from 5 and there remains 2.

RULE.

When the smaller number is placed under the greater, with the right hand or unit figures as in addition, begin at the right hand, and take the lower figure from that above it: but if the lower figure be more than the upper, add 10 to that above, and then take the lower figure from that sum: when we add 10 to the upper figure we must carry 1 to the next lower figure, and proceed.

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EXAMPLES.

436
143
293

Done thus: 3 from 6 and 3 remains—set down 3. 4 from 3 is impossible—add 10 to the 3 makes 13—then 4 from 13 and 9 remains—set down 9, and carry 1 to 1 makes 2—take 2 from 4 and 2 remains.

4	43	54	329	632
2	11	23	217	214
2	32	31	112	
78	94	67	421	632
43	25	35	219	113
35	69	32	202	519
3471	8374	8291	6432	
2246	2546	1423	4764	
1225	5828			
5064	4780	5742	4100	
2193	3182	1852	1146	

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4729	7084	1000	4600
848	189	27	91
4312	6431	41201	78328
2217	2046	13217	21364

From twenty-four take twelve.

Subtract 35 from ninety-three, and tell what remains.

What is the difference between one hundred forty-five, and 321. *Ans.* 176.

Out of 600 bushels of corn, having taken 254 bushels, how many bushels were left?

Take eighty-five pounds of sugar out of a barrel which contained 212 pounds; and tell how many pounds remain.

MULTIPLICATION.

Multiplication shows the amount of any number taken, a proposed number of times: as 12 taken 4 times, or multiplied by 4, amounts to 48. Here 12, the number multiplied, is called the *multiplicand*, the 4 is called the *multiplier*, and 48 the *product*.

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TABLE.

1	2	3	4	5	6	7	8	9	10	11	12
2	4	6	8	10	12	14	16	18	20	22	24
3	6	9	12	15	18	21	24	27	30	33	36
4	8	12	16	20	24	28	32	36	40	44	48
5	10	15	20	25	30	35	40	45	50	55	60
6	12	18	24	30	36	42	48	54	60	66	72
7	14	21	28	35	42	49	56	63	70	77	84
8	16	24	32	40	48	56	64	72	80	88	96
9	18	27	36	45	54	63	72	81	90	99	108
10	20	30	40	50	60	70	80	90	100	110	120
11	22	33	44	55	66	77	88	99	110	121	132
12	24	36	48	60	72	84	96	108	120	132	144

RULE.

The multiplier being placed under the multiplicand, begin at the right hand figure, multiply—carry the tens to the next product, and set down what is over, as in addition.

When the multiplier is more than 12, use each of its figures separately, beginning at the right hand, and set the first figure of the product of each exactly under it. Add the several products together: their sum is the right product.

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EXAMPLES.

4875
2
9750

Thus done: twice 5 is 10—set down 0 and carry 1. Twice 7 is 14, and 1 carried is 15—set down 5 and carry 1. Twice 8 is 16 and 1 is 17—set down 7 and carry 1.—Twice 4 is 8 and 1 is 9—set down 9.

Product 9750.

234	341	643	732	321
2	3	3	4	4
468	1023	1929	2928	1284
352	437	143	144	612
5	6	7	8	9
1760	2622	1001		
407	324	632	489	674
10	11	12	2	3
875	689	807	409	890
4	5	6	7	8

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794	839	643	870	462
9	10	11	12	20

6473
24

25892
12946

155352

First, multiply by 4; 4 times 3 is 12—set down 2 and carry 1: 4 times 7 is 28 and 1 is 29—set down 9 and carry 2: 4 times 4 is 16 and 2 is 18—set down 8 and carry 1: 4 times 6 is 24 and 1 is 25—Then multiply by 2: twice 3 is 6—set down 6 under the 2 in the place of tens beneath the 9 in the other product: twice 7 is 14—set down 4 and carry 1. Twice 4 is 8 and 1 is 9—set down nine. Twice 6 is 12—set down 12. Then add up the two products, beginning at the right hand. 2 is 2—set down 2 under it at the bottom. 6 and 9 is 15—set down 5 and carry 1. 4 and 8 is 12 and 1 is 13—set down 3 and carry 1. 1 to 9 is 10 and 5 is 15—set down 5 and carry 1. 1 to 2 is 3 and 2 is 5—set down 5. 1 is 1—set down 1. *Product* 155352.

14376	69843	64207
31	62	87

94321	40632	82049
95	125	243

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37465	96043	64125
324	419	567
84060	39469	93479
728	690	880
76432	63241	32060
704	806	434
70320	43261	87690
987	5634	3788

Multiply 325 by twelve. 3900.

Find the product of 739 multiplied by one hundred and twenty-three. 90897.

If a man buy one pound of butter for 25 cents, how many cents would five pounds come to?

Ans. 125.

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One barrel of flour weighs 196 pounds: How many pounds are there in twenty-five barrels?

Suppose in a window there are twelve lights of glass one way, and eight lights the other way: How many in all?

DIVISION.

Division shows how many times one number is contained in another: as 3 in 15 is contained 4 times.

The number to be divided is called the *dividend*, the number to divide by, the *divisor*; the number sought, the *quotient*, and whatever is over is called the *remainder*.

LONG DIVISION.

Long Division is that wherein the whole process of dividing is regularly set down by the following

RULE.

Consider how many of the left hand figures of the dividend it will take to contain the divisor, and then find how many times the divi

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is contained in them: Set this number in the quotient; multiply the divisor by it, set the product under those left hand figures, and subtract it from them. To the remainder bring down the next figure of the dividend, and proceed as before.

NOTE. If the product of the divisor by the quotient figure be greater than the number the divisor was to go into, it will not go so many times: But if after subtracting, the remainder be greater than the divisor, it will go more times.

EXAMPLES.

divisor. dividend. quotient.

```
3)1373(457
  12
  --
   17
   15
   --
    23
    21
    --
     2  Remainder.
```

Operation:—3 into 13 goes four times, set down 4 in the quotient; multiply 3 by 4 gives 12—set down 12 under the 13; subtract 2 from 3 and one remains; 1 from 1 and nothing is left. Bring down the next figure of the dividend which is 7, makes 17—3 into 17 goes 5 times—set down 5 in the quotient; multiply 3 by 5 gives 15—set it under the 17, and subtract it therefrom; the remainder is 2. Bring down the 3, makes 23. 3 into 23 goes 7 times—set 7 in the ...iply and subtract as before—the last re... Thus we find that 3 goes 457 times into ...r.

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2)315(	3)431(	4)501(
5)663(	6)854(	7)801(
8)1058(	9)1120(	10)1246(
11)1353(	12)2546(	2)1586(
3)1436(	4)1787(	5)2127(
6)3139(	7)2264(	8)4189(
9)1914(	10)3784(	11)4741(
12)6137(	13)1457(	14)1569(
15)1818(	16)3384(	17)1890(
18)2179(	19)2171)	20)6314(
21)4461(	25)5281(	27)3041(
30)3641(	32)6761(	36)7597(
40*)37481(		57)83246(

* 0's on the right hand of a divisor, may be cut off, provided as many figures on the right of the dividend be cut off; both being rejected in the work, it will thus rendered more easy. But those figures of the divisor must be annexed to the remainder.

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62)74871(

81)13132(

100)76214(

121)78321(

210)76543(

319)87461(

441)87406(

629)13784(

1171)18394(

2141)87941(

75)89461(

95)13743(

112)18746(

125)63214(

241)61324(

325)41232(

554)84329(

843)47632(

1270)89394(

4769)63074(

Find how many twelves there are in 4548.

Divide 794966 by eighteen.

Quotient 44164 and 14 over.

How many times is 27 contained in nine hundred fifty-three? *Ans.* 35 times & 8 over.

Suppose 2072 apple-trees be planted in 14 rows, how many will there be in each row?

ivide 874 cents equally among six boys.

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SHORT DIVISION.

When the divisor does not exceed 12, the work may be contracted by the following

RULE.

See how often the divisor is contained in the first figure or figures of the dividend as before: set the result under it; if any remain, suppose it to be prefixed to the next dividend figure. Find how often the divisor is contained therein; and so proceed.

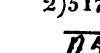
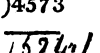
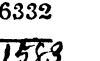
EXAMPLES.

2)3579

1789+1

Operation: 2 into 3 goes once, and 1 over; set down 1 under the 3; suppose the remaining 1 to be placed before the 5—this would make 15. 2 into 15 goes 7 times, and 1 over—set down 7. 1 prefixed to the next figure, which is 7, makes 17. 2 into 17 goes 8 times and 1 over—set down 8. Prefix the 1 to the 9 makes 19. 2 into 19 goes 9 times and one over—set down 9; and the 1 over, a little to the right hand, separated from the 9 by a +. Here 2 into 3579 goes 1789 times and 1 over.

2)5174 3)4573 4)6332

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5)7432	6)8743	7)8946
8)1974	9)7894	10)8463
11)8432	12)4794	20)7432

How many 8's in 169? *Ans.* 21+1.

In 440 how many eleven's? *Ans.* 40.

If a man receive 642 cents for 6 days labour, what is that for each day?

What is the half of 24?

FEDERAL MONEY.

The denominations are:

10 mills (*m.*) make	1 cent,	*c.*
10 cents	1 dime,	*d.*
10 dimes, or 100*cts.*	1 Dollar,	*D.*
10 Dollars	1 Eagle,	*E.*

NOTE. 50 cents 1 half dollar, 25 cents 1 quarter of a dollar.

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Federal money is added, subtracted, multiplied and divided exactly like common numbers.

When the question is in dollars and cents only, in the answer point off on the right hand, two figures for cents, the rest will be dollars.

If the cents are less than 10, put a 0 between the cents and the dollars: and when there are no cents, put two 0's in the place of cents.

Examples in Addition.

D.	*c.*	*D.*	*c.*	*D.*	*c.*
431,	21	741,	29	47,	60
374,	60	234,	80	6,	49
178,	09	614,	37	743,	04
643,	49	164,	09	13,	46
497,	43	327,	37	9,	00

Examples in Subtraction.

D.	*c.*	*D.*	*c.*	*D.*	*c.*
431,	61	701,	36	100,	00
219,	28	429,	67	33,	09

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Examples in Multiplication.

D. c.	D. c.	D. c.
13, 63	29, 08	30, 60
5	8	12

D. c.	D. c.	D. c.
42, 04	73, 49	83, 97
62	75	9 04

Examples in Division.

D. c.	D. c.	D. c.
2)37, 42	4)67, 24	8)4, 32

D. c. D. c.	D. c. D. c.
23)49, 22(	46)129, 34(

NOTE. Notwithstanding the denominations of Federal money are divided into Eagles, Dollars, dimes, cents and mills, the usual method of reckoning has rejected *eagles* and *dimes*, and the term *mill* is little used—Dollars and cents answer nearly all purposes. When a sum of money is set down in figures, the dollars and cents are separated by a small point, or comma; the figures on the left hand this mark, are read *dollars;* and the two figures on the

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right hand of it are read *cents:* thus, 324 dollars 29 cents would be expressed $324,29 having a crooked $ with two strokes lengthwise placed before it, to denote dollars, &c. when mills are expressed, they are placed at the right hand of cents, thus $324,295. Federal money being reckoned by 10's—2 eagles, 4 dollars is the same as 24 dollars: 2 eagles 4 D. 3 d. 2 cts. the same as 2432 cents, or 24 dols. 32 cts. and 2 E. 4 D. 3 d. 2 cts. 1 mill, the same as 24321 mills, or 24 dols. 32 cts. 1 mill. In adding, subtracting, multiplying, or dividing Federal money, care must be taken to keep the several denominations in regular order under each other, as mills under mills, cents under cents, dimes under dimes, and dollars under dollars; and to place the point between the dollars and dimes: For though dimes may not be mentioned, their place always virtually exists. Thus, in the first example of Federal money, 3d line, we find 178 dols. 09 cts. that is 178 dols. 0 dimes, 9 cts; for if the 9 had been placed where the 0 is, it would indicate 9 dimes, which is 90 cents.

A man received 149 dollars 37 cents at one time: at another 47 dollars 50 cents; and at another 87 dollars 84 cents: how much did he receive in all?

Ans. 284 Dols. 71 cts.

Paid for sundry articles, as follows:

		D.	*c.*
1 barrel of flour	price	6,	50
1 ditto mackarel	-	7,	75
3 bushels of salt	- -	3,	00
The whole amount			

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Out of 100 dollars there was taken thirty-five dollars and a quarter, how much was left?

Ans. 64 dols. 75 cts.

Take fourteen dollars twenty-eight cents from twenty dollars, and tell what will remain.

Ans. 5 dols. 72 cts.

If 1 bushel of wheat be worth 1 dol. 4 cents, how much is 12 bushels worth?

Ans. 12 dols. 48 cts.

Bought 8 pounds of cheese, at 11 cents a pound; what did it amount to?

Find the price of 24 gallons of vinegar, at 33 cents a gallon.

Sold 2 yards of linen for 1 dollar; what was it for 1 yard?

If 11 bushels of salt be worth 15 dollars 40 cents, how much is 1 bushel worth?

Ans. 1 dol. 40 cents.

Bought 25 thousand bricks for 162 dollars 50 cents: how much was that a thousand?

Ans. 6 dols. 50 cts.

I received at one time 7 dollars 8 cents; at a second time, 8 dollars 25 cents; at a third, 41 dollars 6 cents; and at a fourth, 14 dollars 16 cents; how much in all? *Ans.* 70 dols. 55 cts.



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From 75 dollars 9 cents, take 18 dollars 14 cents. *Facit* 56 dols. 95 cts.

How much money must be given for 76 gallons of wine, at 2 dollars 3 cents a gallon?
Ans. 154 dols. 28 cts.

Divide ten dollars equally between four men.

At 24 cents a pound, what will 463 pounds of coffee come to?

Take 4 dollars 13 cents out of a note of 10 dollar, what remains?

COMPOUND ADDITION.

Compound Addition teaches to add several quantities of different names, into one sum.

RULE.

Place the numbers so, that those of the same name may stand directly under each other.

Add up the right hand column, and divide the amount by as many of that name as make 1 of the next greater.

Set down the remainder under the column, carry the quotient to the next column: and so proceed.

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ENGLISH MONEY.

The denominations (or names) are:

4 farthings	*qr.*	make 1 penny,	*d.*
12 pence		1 shilling,	*s.*
20 shillings		1 pound,	*£.*

Pence Table.

d.	*s.*	*d.*
12 pence make	1	0
20 - -	1	8
24 - -	2	0
30 - -	2	6
36 - -	3	0
40 - -	3	4
48 - -	4	0
50 - -	4	2
60 - -	5	0
70 - -	5	10
72 - -	6	0
80 - -	6	8
84 - -	7	0
90 - -	7	6
96 - -	8	0
100 - -	8	4
108 - -	9	0
110 - -	9	2
120 -	10	0

Table of Shillings.

s.	*£.*	*s.*
20 shillings make	1	0
30 - -	1	10
40 - -	2	0
50 - -	2	10
60 - -	3	0
70 - -	3	10
80 - -	4	0
90 - -	4	10
100 - -	5	0
110 - -	5	10
120 - -	6	0

$\frac{1}{4}$ one farthing.
$\frac{1}{2}$ two farthings or a half-penny.
$\frac{3}{4}$ three farthings.

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EXAMPLES.

£.	s.	d.	qr.
	10	12	
4	13	4	½
8	16	7	¾
3	17	0	½
4	18	1	¾
22	5	2	2

Operation: Begin with the farthings. 3 and 2 is 5 and 3 is 8, and 2 is 10: 10 farthings divided by 4, (because 4 farthings make 1 penny) gives 2 pence and 2 farthings over: set down the 2 farthings and carry the 2 pence to the next column. 2 carried to 1 makes 3, and 7 is 10, and 4 is 14: 14 pence divided by 12 (because 12 pence make 1 shilling) gives 1 shilling, and 2 pence over: set down the 2 pence, and carry 1 shilling to the shillings. 1 carried to 8 is 9, and 7 is 16, and 6 is 22, and 3 is 25. 2 carried to 1 makes 3 and 1 is 4, 1 is 5, and 1 is 6—the whole number of shillings is 65: divide 65 shillings by 20, (because 20 shillings make 1 pound) gives 3 pounds, and 5 shillings over: set down five under the shillings and carry 3 pounds to the pounds. 3 carried to 4 is 7, and 3 is 10, and 8 is 18, and 4 is 22—set down 22. *Total* 22 pounds, 5 shillings and 2 pence halfpenny.

£.	s.	d.
	11	10
6	13	4
4	12	6
9	2	3

£.	s.	d.
8	4	6
9	11	7
2	14	3

£.	s.	d.
9	12	9
7	13	6
6	14	3

NOTE. Children should be taught to put small d tween the figures of the different denominations.

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£.	s.	d.
13	12	9
44	6	4
3	17	6

£.	s.	d.
83	11	7
41	10	8
64	9	4

£.	s.	d.	qr.
8	7	6	2
1	18	7	3
3	14	8	2

£.	s.	d.
91	14	3
4	11	6
16	14	9

£.	s.	d.
18	17	6
33	13	6
84	14	7

£.	s.	d.	qr.
8	12	3	2
7	11	7	2
2	19	10	2

£.	s.	d.
76	13	8
41	12	9
17	3	8
82	14	6

£.	s.	d.
81	19	0
73	13	6
34	12	4
64	1	0

£.	s.	d.	qr.
7	8	0	½
8	7	3	¼
4	6	4	½
1	0	7	¼

£.	s.	d.
17	18	6
13	17	3
14	10	0
16	13	4
19	10	1

£.	s.	d.
91	16	3
81	17	4
32	1	1
	17	6
	4	7

£.	s.	d.	qr.
9	17	4	½
	13	8	½
		9	¼
	16	3	½
4	1	2	¼

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TROY WEIGHT.

By this weight jewels, gold, silver and liquors are weighed.

The denominations are:

24 grains (*grs.*) make	1 pennyweight,	*dwt.*
20 pennyweights	1 ounce,	*oz.*
12 ounces	1 pound,	*lb.*

lb.	*oz.*	*dwt.*	*gr.*
4	3	12	13
6	7	14	17
4	6	18	14
3	2	9	8

lb.	*oz.*	*dwt.*	*gr.*
6	8	10	6
9	4	11	9
4	6	13	3
3	3	4	14

AVOIRDUPOIS WEIGHT.

By this weight are weighed things of a coarse, drossy nature, that are bought and sold by weight, and all metals but silver and gold.

The denominations are:

16 drams *dr.* make	1 ounce,	*oz.*
16 ounces	1 pound,	*lb.*
28 pounds	1 quarter of an Cwt,	*qr.*
4 quarters, or 112 *lb.*	1 hundred weight,	*Cwt.*
20 hundred weight	1 ton,	*T*

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NOTE. Of sugar, rice, flour, hay, iron lead, &c. 112 *lbs.* 1 *cwt.* But of other articles, such as meat, cheese, butter, &c. 100 *lbs* make 1 *cwt.*

T.	*cwt.*	*qr.*	*lb.*	*Cwt.*	*qr.*	*lb.*
4	6	3	12	417	3	13
4	12	2	14	214	1	07
8	16	3	16	314	0	21
4	17	2	24	87	3	27

LONG MEASURE.

Long measure is used for lengths or distances.

The denominations are:

3 barley-corns, *(b. c.)* make	1 inch,	*in.*
12 inches	1 foot,	*ft.*
3 feet	1 yard,	*yd.*
5½ yards or 16½ feet	1 rod, pole, or perch,	*P.*
40 poles or *(220 yds.)*	1 furlong,	*fur.*
8 furlongs or *(1760 yds.)*	1 mile,	*M.*
3 miles	1 league,	*L.*

NOTE. A hand is a measure of 4 inches, and particularly applied to measuring the heights of horses; and the fathom of 6 feet, to the depth of water.

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L.	*m.*	*fur.*	*p.*
44	2	6	13
87	1	2	18
46	0	3	24
67	1	7	37

yds.	*ft.*	*in.*
61	2	6
87	1	7
17	0	6
43	1	4

CLOTH MEASURE.

By this measure cloths, linens, muslins, &c. are measured.

The denominations are:

2¼ inches *(in.)* make	1 nail,	*na.*
4 nails	1 quarter of a yard,	*qr.*
4 quarters	1 yard,	*yd.*
3 quarters	1 ell Flemish,	*E. F.*
5 quarters	1 ell English,	*E. E.*

Yd.	*qr.*	*na.*
46	1	0
36	3	3
44	1	1
98	3	3

EE.	*qr.*	*na.*
43	4	3
96	3	1
74	1	2
46	4	2

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LAND MEASURE.

This measure shews the quantity of lands.

The denominations are:

9 square feet *(ft.)* make	1 square yard, *yd.*
30¼ square yards	1 square perch, *P.*
40 perches	1 rood, *R.*
4 roods	1 acre, *A.*

A.	*R.*	*P.*
314	2	12
120	0	37
34	3	13
4	2	31

A.	*R.*	*P.*
91	0	20
163	3	34
6	1	19
430	3	22

LIQUID MEASURE.

Liquid measure is used for beer, cider, wine, &c.

The denominations are:

2 pints *(pt.)* make	1 quart, *qt.*
4 quarts	1 gallon, *gal.*
63 gallons	1 hogshead, *hhd.*
2 hogsheads	1 pipe or butt, *p. or b.*
2 pipes or 4 hhds	1 tun, *T.*

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NOTE. 16 gallons make one half barrel; 31½ gallons 1 barrel: 64 gallons 1 double barrel: 84 gallons 1 puncheon: 42 gallons 1 tierce.

Hhds.	*gal.*	*qt.*
7	43	3
2	19	1
6	13	3
7	23	2

gals.	*qt.*	*pt.*
146	2	0
184	3	1
321	0	1
439	3	1

DRY MEASURE.

This measure is used for grain, fruit, salt, &c.

The denominations are:

2 pints (*pt.*) make	1 quart, *qt.*
8 quarts	1 peck, *p.*
4 pecks	1 bushel, *Bu.*

Bu.	*p.*	*qt.*
63	2	4
36	1	4
83	1	7
87	3	6

Bu.	*p.*	*qt.*
743	2	0
784	0	7
337	3	4
789	3	6

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TIME.

The denominations are:

60 seconds (*sec.*) make	1 minute,	*min.*
60 minutes	1 hour,	*h.*
24 hours	1 day,	*d.*
7 days	1 week,	*w.*
52 weeks, or 365 days	1 year,	*Y.*

NOTE. The length of a year is computed to be 365 days 6 hours, nearly; hence a common year consists of 365 days, and every fourth, called leap-year, of 366.

In the almanac the year is divided into 12 months: of which,

The fourth, eleventh, ninth and sixth,
Have thirty days to each affix'd;
And every other thirty-one,
Except the second month alone,
Which has but twenty-eight in fine,
Till leap year gives it twenty-nine.

wk.	*d.*	*h.*	*days.*	*h.*	*min.*	*sec.*
13	4	7	146	13	16	29
24	2	14	423	14	39	48
17	3	15	678	21	43	54
8	6	21	314	19	18	53

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Application of Compound Addition.

Find the amount of the following: 9 dollar 15 cents, 3 dollars 78 cents, and 7 dollars 63 cents. 12 *dols.* 56 *cts.*

Laid out for sundries, namely,

	£	s.	d.
2 yards of cloth,	2	10	6
1 yard linen,		3	9
4 yards silk,	1	15	0
Amount	4	9	3

Suppose a man borrowed at one time 7*£.* 16*s.* 4*d.* at another 12*£.* 18*s.* 9*d.* and at a third time 20*£.* 9*s.* 4*d.* how much did the whole amount to? 41*£.* 4*s.* 5*d.*

A person has a silver dish weighing 4*lb.* 10*oz.* 15*dwts.* 21*grs.*; a bowl weighing 2*lb.* 1*oz.* 16*dwts.* 14*grs.*; and a tankard weighing 2*lb.* 8*oz.* 5*dwts.* 12*grs.*: how much do they all weigh? *Ans.* 9*lb.* 8*oz.* 17*dwts.* 23*grs.*

Bought 3 bags of hops, each weighing 1*Cwt.* 3 *qrs.* 27*lb.*: how much do they all weigh?
Ans. 5*Cwt.* 3*qrs.* 25*lb.*

Bought 2 loads of hay, one of which weighed 16*Cwt.* 3*qrs.* 14*lb.*; and the other 18*Cwt* 3*qrs.* 24*lb.* how much do both weigh?

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Add 1 *mile* 7 *fur.* 34 *poles*; 11 *miles* 3 *fur.* 19 *poles*; 4 *miles* 6 *fur.* 37 *poles*, and 4 *miles* 0 *fur.* 16 *poles* together. *Ans.* 22*M.* 2*fur.* 26*p.*

A piece of muslin contains 31*yds.* 2*qr.* 3*na.* another 43*yds.* 3*qr.* 1*na.*; and a third 24*yds.* 3*qr.* 3*na.*: what is the whole quantity in them?
Ans. 100*yds.* 1*qr.* 3*na.*

In one field are 27 acres 3 roods 27 perches; in another 17 acres 3 roods 36 perches; and in a third 41 acres 3 roods 13 perches: how much in all? *Ans.* 87*A.* 2*R.* 36*P.*

Sold 4 vessels of cider; two of which contained 94 gallons each; and the other two 87 gals. 2qts. each: how many gallons in all?
Ans. 363 *gallons.*

A farmer measured up at one time 13 bushels 2 pecks 2 quarts of wheat; at another 27 bushels 3 pecks; at a third time 7 bushels no pecks and 3 quarts; and lastly 29 bushels 3 pecks 3 quarts: how much had he in all?

COMPOUND SUBTRACTION.

Compound Subtraction teaches to subtract quantities of different names.

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RULE.

Place the quantities as in compound addition, with the less under the greater.

Then begin at the right-hand, and take the lower number from the upper: but if the lower number be greater than the upper, add to the upper number as many of that name as will make 1 of the next greater, then take the lower number therefrom: set down what remains, and carry 1 to the next as in simple subtraction.

EXAMPLES.

£.	s.	d.
47	10	4¼
13	14	7½
33	15	8¾

Operation. Begin at the farthings: the lower number, a halfpenny, or 2 farthings, is greater than the upper, which is 1 farthing: add 4 to the 1 because 4 farthings make 1 penny, makes 5; take 2 farthings from 5 and 3 remains; set down ¾, and carry 1 to 7 makes 8; here again the lower number is greater than the upper: add 12 to the upper number, because 12 pence make 1 shilling, makes 16: take 8 pence from 16 and 8 remains, set down 8 and carry 1*s.* to 14*s.* makes 15: the upper number is again less than the lower, add 20 to it because 20 shillings make 1 pound, makes 30*s.* take 15*s.* from 30*s.* and 15 remains; set down 15, and carry 1 to 3, makes 4, 4 from 7 and 3 remains, 1 from 4 and 3 remains. Thus we find that taking £.13, 14, 7½, from £47 10, 4¼, leaves a remainder of £.33, 15, 8¾.

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£.	s.	d.
42	10	9
21	4	6

£.	s.	d.
8	0	9
4	12	6

£.	s.	d.
9	12	6
2	14	8¼

£.	s.	d.
48	10	6
29	1	5

£.	s.	d.
6	10	4
2	15	6

£.	s.	d.
7	10	1
1	5	4½

£.	s.	d.
13	6	3
9	17	5

£.	s.	d.
4	6	0
3	17	4½

£.	s.	d.
2	11	4¼
1	[illegible]	7½

£.	s.	d.
97	0	0
4	8	2

£.	s.	d.
11	0	6
4	9	6

£.	s.	d.
1	12	6
	13	9½

lb.	oz.	dwt.	gr.
18	4	13	14
10	6	18	12

lb.	oz.	dwt.	gr.
12	3	16	4
9	7	4	16

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Cwt.	*qr.*	*lb*
26	1	12
11	2	20

T.	*cwt.*	*qr.*	*lb.*
17	14	0	13
13	16	2	22

M.	*fur.*	*p.*
63	4	0
18	6	21

Yds.	*ft.*	*in.*
310	1	6
239	2	9

Yds.	*qr.*	*na.*
44	2	1
29	3	1

EE.	*qr.*	*na.*
131	0	0
64	2	2

A.	*R.*	*P.*
600	1	33
49	2	21

A.	*R.*	*P.*
332	0	20
139	3	34

Hhds.	*gals.*	*qt.*
13	17	2
7	24	3

Gals.	*qt.*	*pt.*
1137	2	0
694	3	1

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B.	*pk.*	*qt.*
314	2	0
219	2	6

B.	*pk.*	*qt.*
1413	0	0
641	2	3

Wks.	*d.*	*h.*
22	1	14
12	6	20

D.	*h.*	*min.*	*sec.*
141	13	20	30
84	20	35	40

Application of Compound Subtraction.

Out of one thousand dollars having taken 347 dollars and seventy-five cents, how much was there remaining?

Ans. 652 *dols.* 25 *cts.*

From 33*£*. 4*s*. 9*d*. take 21*£*. 12*s*. 4½*d*. and tell what remains.

Ans. 11*£*. 12*s*. 4½*d*.

A man owed 200*£*. and paid 83*£*. 10*s*. 6*d*. thereof; how much is he still in debt?

Ans. 116*£*. 9*s*. 6*d*.

From 7*s*. 6*d*. take 5*s*. 7½*d*. and tell what is left?

Ans. 1*s*. 10½*d*.

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The brewer has an account on the baker, amounting to 46*£*. 13*s*. 4*d*. against which the baker has an account amounting to 29*£*. 16*s*. 9½*d*. what is the balance due from the baker to the brewer?

K had 235 *dols*. 2 *cts*. Q has 437 *dols*.; who has the most, and how much?

Out of 60 *dols*. having taken twenty-five dollars thirty-four cents and a half, what remains?

From 13*lb*. 3*oz*. 15*dwt*. 13*gr*.; take 8*lb*. 11*oz*. 12*dwt*. 16*gr*.: how much remains?

Ans. 4*lb*. 4*oz*. 2*dwt*. 21*gr*.

Bought a cask of flour weighing 1*cwt*. 3*qrs*. 12*lb*. cask and all; if the cask weighs 14*lb*. what is the quantity of flour?

Ans. 1*cwt*. 2*qrs*. 26*lb*.

An ironmonger bought 2 *tons*. 13*cwt*. 3*qrs*. 11*lb*. of iron; and sold thereof 19*cwt*. 3*qrs*. 24*lb*. how much had he left?

Ans. 1*T*. 13*cwt*. 3*qrs*. 15*lb*.

A load of hay weighed 20*cwt*. 1*qr*. 14*lb*. of which was sold 12*cwt*. 3*qrs*. 20*lb*. how much was left?

A certain rope is 364 yards, 1 foot, 6 inches long, if 183 yards 2 feet 4 inches be cut off, how long will the remainder be?

180*yds*. 2*ft*. 2*in*.

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A piece of linen contains 36*yds.* 2*qrs.* 1*na.* if 13*yds.* 2*qrs.* 2*na.* be taken off, how much will remain? *Ans.*22*yds.* 3*qrs.* 3*na.*

From 16 yards of cloth, having taken off 9 yards 2*qrs.* how much is left?

Ans. 6*yds.* 2*qrs.*

A barrel of cider containing 31gal. 2qt. having sprung a leak, the liquor was drawn off, and when measured, there was no more than 23gals. 2qt. 1pt. remaining, what quantity was lost?

Ans. 7*gal.* 3*qt.* 1*pt.*

In a certain plantation there were 347 acres 2 roods 37 perches: but 147 acres 3 roods 16 perches being sold off, I demand what quantity remains?

A corn merchant had 537 bushels of buckwheat, of which he sold 329*bu.* 2 pecks. what had he left?

Out of a certain granary, where 49 bushels 2 pecks 1 quart of corn had been deposited, there was taken 29 bushels 1 peck 3quarts: how much remains in the granary?

From 1 week, take 3 days 13 hours 47 minutes 36 seconds.

NOTE. The interval or space of time between two given [illegible] is found thus:—set the former or first date under the [illegible] when the lower number of days is greater

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than the upper, add to the upper as many days as there are in the month mentioned in the first or lower date; subtract and carry 1 as usual. When the number of months in the lower is greater than that in the upper date; borrow 12 and carry 1 to the years.

Suppose it be required to find the space of time between the 23d day of the 6th month, 1804, and the 12th day of the 3d month, 1809.

	year.	*mo.*	*d.*
First set down the last date thus:	1809	3	12
then the former under it.	1804	6	23
	4	8	19

Then 23 days being more than 12, the number above it, add to 12 as many days as there are in the lower month (6th) which is 30; they come to 42; take 23 from 42 and there remains 19; carry 1 to the months: 6 and 1 is 7; then because the upper number of months is less, add 12 thereto (because 12 months are 1 year) which makes 15; take 7 from 15 and 8 remains, carry 1 to 4 makes 5; 5 from 9 and 4 remains, &c. Thus the space of time between the two dates is found to be 4 years 8 months and 19 days.

Harry was born the 24th of the 9th month, 1803, what was his age the 16th of the 4th month, 1808? *Ans.* 4*y.* 6*m.* 22*d.*

A bond was dated the 13th of *8th month*, (August) 1807, and taken up the 9th of *9th month*, (September) 1808, for what time must interest thereon be computed.

Ans. 1*y.* 0*m.* 2*d*

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I was born the 21st of 3*d month* (March,) 1799, what is my age this 10th day of 5*th month* (May,) 1809.

Dick was bound to serve his master till the 18th of the 4th month, 1812; how long from the 24th of the 5th month, 1809, till he is out of his time?

COMPOUND MULTIPLICATION.

Compound Multiplication teaches to multiply sums or quantities of different denominations or names.

RULE.

Place the multiplier under the least denomination: multiply, and divide the product, (as in compound addition) by as many of this name as make one of the next greater; set down the remainder. Then multiply the next part of the quantity, and add the last quotient to this product; divide again, and proceed as before.

EXAMPLES.

£.	s.	d.
8	12	6½
		3
		7½

Operation:—3 the multiplier being set under the least part of the quantity to be multiplied, begin—3 times ½ or 2 farthings is 6, 6 divided by 4, because 4 farthings make 1 penny, gives 1 and 2



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over: set down 2 farthings or ½, and carry 1; 3 times 6 is 18, and 1 carried is 19; 19 divided by 12 because 12 pence 1 shilling, gives 1 and 7 over, or 1 shilling and 7 pence: set down 7 pence, and carry 1: 3 times 12 is 36 and 1 carried is 37: 37 divided by 20 because 20 shillings makes 1 pound, gives 1 pound and 17 shillings over: set down 17 shillings, and carry 1: 3 times 8 is 24 and 1 carried is 25. Thus £.8 12 6½ multiplied by 3 gives £.25 17 7½

£.	s.	d.
32	13	4
		2

£.	s.	d.
19	11	9½
		3

£.	s.	d.
94	6	8
		4

£.	s.	d.
84	18	6¼
		5

£.	s.	d.
41	16	0
		6

£.	s.	d.
1	19	11½
		7

lb.	oz.	dwt.	gr.
9	6	4	13
			8

T.	c.	qr.	lb.
3	7	3	12
			9

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M.	*fur.*	*p.*
37	3	17
		10

Yds.	*qr.*	*na.*
46	3	3
		11

A.	*R.*	*P.*
43	0	16
		12

Gals.	*qt.*	*pt.*
130	2	1
		3

B.	*pk.*	*qt.*
17	3	3
		5

Days.	*h.*	*min.*
18	14	13
		7

Application.

To find what any quantity or number of articles come to at a certain price per Cwt. lb. yd. gal. bu. &c.

Multiply the price of *one*, by the whole number; the product will be the answer.

When the quantity exceeds 12—for instance 36, 60, or 81, and the price is in pounds, shillings and pence, it is most convenient to multiply by the 2 numbers which in the multiplication table, are found to produce this quantity, as 3 times 12 is 36, 6 times 10 is 60, 9 times 9 is 81, &c. Thus, if it be required to find how much 36 bushels

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of wheat come to at 9s. 4d. a bushel, multiply the 9s. 4d. by 3; which gives 1£. 8s. 0d. or the price of 3 bushels: this multiplied by 12, (because 12 times 3 is 36) gives 16£. 16s. 0d.; the price of 36 bushels.

But had the quantity been such a number as no two figures in the table would produce, for instance 37, which is not found in the multiplication table; take those that will come the nearest to it, and add for the overplus, as much as the price thereof: thus, for 37 bushels, find what 36 come to as before mentioned, which is 16£. 16s. 0d. and to this add the price of one bushel, because 37 is 1 more than 36:—9s. 4d. the price of 1 bushel, added to the price of 36, gives 17£. 5s. 4d.; which is the price of 37 bushels. So of other numbers.

What will 2 yards of linen come to, at 63 cents a yard? *Ans.* $1, 26.

Find the price of 3 bushels of salt, at 94 cents a bushel. $2, 82

How much will 5lb. of butter come to, at 2s. 4d. a pound? *Ans.* 11*s.* 8*d.*

Required the price of a dozen pounds of sugar, at 1s. 2d. a pound. *Ans.* 14s. 0*d.*

What is the amount of 8 cords of wood, at 4 dols. 50 cents a cord? *Ans.* $36, 00.

Find the price of a quarter of veal weighing 20lb. at 9d. a lb. *Ans* 15*s.*

A person purchased 24 yards of muslin, a quarter of a dollar a yard: what did it come to? *Ans.* $6, 00—or 2£. 5*s*

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How much for 33 gallons of wine at 9s. 6d. a gallon? *Ans.* 15£. 13*s.* 6*d.*

Calculate the amount of 11 barrels of beer, at 5 dollars 25 cents a barrel. $57, 75.

Sold ten tons of hay, at 16 dollars 50 cents a ton: What is the amount? *Ans.* $165, 00.

How much does 36 yards of cloth come to, at 9s. 4d. a yard? *Ans.* 16£. 16*s.*

What will 50 days work come to, at half a dollar a day? *Ans.* $25, 00; *or* 9£. 7*s.* 6*d.*

Tell the price of a piece of muslin, measuring 27 yards, at 1s. 10½d. a yard? 2£. 10*s.* 7½*d.*

Required the amount of 80lb. of wool, at 3s. 6d. a pound? *Ans.* 14£.

Find the value of 144 acres of land at 45 dollars an acre. $6480, 00.

Bought a hundred pounds of coffee for 2s. 4d. a lb.: what does it amount to?
Ans. 11£. 13*s.* 4*d.*

At 12½ cents a piece, what must be given for 75 shad? *Ans.* $9, 37½.

At 2s. a lb. what will 13lb. of cotton come to? *Ans.* 1£. 6*s.*

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What cost 17 reams of paper, at 3 dols. 35cts. per ream? *Ans.* $56, 95.

Bought 19 gallons of spermaceti oil, at 9s. 6d. a gallon: what does it come to?
Ans. 8£. 19*s.* 6*d.*

The price of 38lb. of cheese, at 11d. a lb. is required. 1£. 14*s.* 10*d.*

At 6s. 9½d. a bushel, what is the price 52 bushels of rye? *Ans.* 17£. 13*s.* 2*d.*

Sold 67lb. of flax at 1s. 4d. a lb.: what does it amount to? *Ans.* 4£. 9*s.* 4*d.*

At 17½ cents a piece, what must be given for 2 dozen penknives? *Ans.* $4, 20.

What is the amount of 95 bushels of salt, at 7s. 6d. a bushel? *Ans.* 35£. 12*s.* 6*d.*

Find the value of 150lb. of rice, at 6d. a lb.
3£. 15*s.*

What will 134lb. of tallow come to, at 1s. 2d. a lb. *Ans.* 7£. 16*s.* 4*d.*

Tell the price of 135lb. of sugar, at 11d. a a lb. 6£. 3*s.* 9*d.*

Calculate the price of a barrel of pork, weighing 200lb. at 6 cents a lb. $12, 00.

At 10 pence a mile, what will a waggoner require for the carriage of a bale of goods 300 miles? *Ans.* 12£. 10

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How much for 350 bushels of oats, at 33cts. a bushel? *Ans.* $115, 50.

What come 510 gallons of vinegar to, at 1s. 10d$\frac{1}{2}$. a gallon?

Sold 2 lots of ground for 150 dollars a piece; what do they come to?

If 1 yard of cloth cost 17s. 4d$\frac{1}{2}$.; what will 12 yards cost?

What will half a dozen hats come to, at 4 dollars and a half a piece?

At 3s. 4d. a bushel, what will 37 bushels of oats come to?

Find the price of a tierce of brandy at 16s. 8d. a gallon.

What is the price of 2 dozen pairs of stockings, at 84 cents. a pair?

Find the price of a quarter of beef, weighing 109lb. at 6 cents a lb.

At 33 cents a lb. what cost a bag of coffee which weighs 175lb.?

If 1 yard of muslin cost 24 cents, what will 240 yards cost?

A bale of cloth containing 325 yards, is sold at 1£. 13s. 4d. a yard: what does it amount to?

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What is the price of 1000 acres of land, at 15 dols. 25 cents an acre?

At 3 cents a foot, what will 3500 feet of boards come to?

What is the price of 4520lb. of pork, at 11d. a lb.?

BILLS.

Philadelphia, 5 mo. 10th, 1809.

S. Shaw

Bo't of B Hill, *D. c.*

4 yards of muslin, at 36cts. a yard	1, 44
3 pairs of gloves, at 43cts. a pair	1, 29
12 pairs of stockings, at 87 cts.—	10, 44
6 handkerchiefs, at 62½cts. a piece	3, 75
Total	$16, 92

To find the amount of a bill, first find the amount of each article separately, as here set down; and place each to the end of its respective line; then add them up: Thus the total of this is found to be 16 dols. 92cts.

4yds. at 36cts.	3 pairs at 43cts.
4	3
1, 44	1,29
12 pairs at 87cts.	6 handkerchiefs at 62½cts.
12	6
10, 44	3, 75

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Frankford, 5 mo. 24th, 1809.

W. Winter

Bo't of Johnson, & Co.

	D.	c.
3 lb. of tea, at $1, 25 a lb.		
18 lb. sugar, at 12½ cts. ——		
9 lb. coffee, at 32 cts. ——		
3 lb. pepper, at 36 cts. ——		
17 lb. rice, at 06 cts. ——		
32 lb. cheese, at 10 cts. ——		
Amount	$14,	18

Peter Jenkins

To T. Town, Dr.

4 mo. 14th, 1809.

	D.	c.
To 8 bushels of oats at 33 cts. a Bu.		
5 do. wheat, at $1, 62 ——		
10 do. rye, at 67 cts. ——		
Amount	$17,	44

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G. Wilkins

to H. Williams, Dr.

6 *mo.* 6*th*, 1809. *D.* *c.*

To 89lb. veal, at 6 cts. a lb.
146lb. pork, at 5 cts. ——
340lb. beef, at 7 cts. ——
12 bushels salt, at 87 cts a Bu.

Amount $

Bo't at sundry times as follows:

D. *c.*

4 English Readers, at 62½ cts. each
6 Geographies, at 50 cts. ——
2 Comly's spelling Books at 25 cts.
1 Grammar, at 37½ cts.

Amount $

COMPOUND DIVISION.

Compound Division teaches to divide sums or quantities of different denominations.

RULE.

Divide the first denomination on the left hand; the remainder, if any, multiply by as many of the next less denomination, as make one of that, to which add the next, and divide as before.

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EXAMPLES.

Suppose it be required that 8*£*. 13*s*. 6*d*. be divided by 3, or into 3 equal parts.

£.	*s*.	*d*.	*£*.	*s*.	*d*.
3)8	13	6(	2	17	10
6 *Subtract.*					
2 *Remains.*					
20*s*. *Multiply.*					
40					
13*s*. *Add.*					
3)53*s*. *Divide.*					
3					
23					
21					
2 *rem.*					
12*d*. *Multiply.*					
24					
6*d*. *Add.*					
3)30 *divide.*					
30					

Set it down thus, and proceed:

3 into 8*£*. goes twice; set down 2 under *£*. in the quotient, and twice 3 under the 8. Subtract—2 remains. Multiply 2 by 20, because 20 shillings 1 pound—gives 40—to which add the 13*s*. and it makes 53*s*. divide this by 3.—3 into 5 goes once—set down 1 under the *s* in the quotient, and once 3 under the 5. Subtract—2 remains—bring down the 3—makes 23. 3 into 23, goes 7 times—set 7 down with the 1 in the quotient, and 7 times 3 under 23.—Subtract—2 remains. Multiply 2 by 12 because 12 pence 1 shilling—gives 24; to which add the 6 pence from the top—they make 30 pence;—3 into 30 goes 10 times—set 10 under the *d*. in the quotient, and 10 times 3 under the 30, and the work is done.

Ans. 2*£*. 17*s*. 10*d*.

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Divide 14*l*. 17s. 6d. by 6.

In dividing by a number not exceeding 12, the operation may be contracted by short division, thus:

	l.	*s*.	*d*.
6)	14	17	6
	2	9	7

First, 6 into 14, goes twice, and 2 over—set 2 under the 4; the 2 over is 2 pounds, which is 40 shillings—add 40s. to 17s. makes 57s. 6 into 57, 9 times, and 3 over—set down 9 under the 7: the 3 over is 3 shillings, which is 36 pence—add 36d. to the 6d. makes 42d. 6 into 42, 7 times exactly: set down 7 under the 6d. and it is done.

The following examples may be wrought either way.

	l.	*s*.	*d*.
2)	37	13	6

	l.	*s*.	*d*.
3)	91	17	$9\frac{3}{4}$

	E.	*D*.	*d*.	*c*.	*m*.
4)	91	4	6	4	8

	lb.	*oz*.	*dwt*.	*gr*.
5)	6	5	11	16

	Cwt.	*qr*.	*lb*.
6)	39	2	18

	M.	*fur*.	*P*.
7)	17	4	26

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Yd. qr. na.	*A. R. P.*
8)63 2 0	9)49 3 36
Gal. qt. pt.	*B. pk. qt.*
10)427 2 0	11)36 3 1
Days. h. min.	*£. s. d.*
3)74 14 80	9)47 14 6

APPLICATION.

Bought 2 yards of brown holland for 1 dollar 10 cts.: what was that for 1 yard?

Ans. 55 *cts.*

Paid a labourer 1 dollar 50 cts. for 3 days work, how much was that for each day?

Ans. 50 *cts.*

Four bushels of salt cost 1*£*. 4s. 8d.: what was it a bushel? *Ans.* 6*s.* 2*d.*

NOTE. To find the quarter of any sum or quantity, divide it by 4. To find the half, divide by 2: and to find quarters, multiply 1 quarter by 3.

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What is the half of 2£. 6s. 3d?
Ans. 1£. 3*s.* 1½*d.*

Required the quarter of 100 dollars. $25

Divide 17£. 13s. 6d. by 6. 2£. 18*s.* 11*d.*

If a man earn 6£. 5s. 4d. in 16 days, what does he earn in 1 day? *Ans.* 7*s.* 10*d.*

If the price of 1 bushel of wheat be 17*s.* 6d. what is the price of half a bushel? *Ans.* 8*s.* 9*d.*

If a ton of hay cost 17 dols. 50 cts. what is that for half a ton? *Ans.* 8*dols.* 75*cts.*

A field of corn contains 14 acres 3 roods 30 perches, and it is to be divided equally among 4 men: what is each man's share?
Ans. 3*A.* 2*R.* 37½*P.*

At 1£. 10s. 6d. a yard, what is the price of a quarter of a yard of cloth?

A piece of cloth containing 46yds. 3qrs. is to be divided into 4 equal parts; what will be the length of each of them?

Three hundred dollars is to be divided equally among 25 men: what is each man's share?

A man purchased 22 yards of linen for 3£. 17s.: what was it a yard?

Bought 100 barrels of flour for 575 dollars what was that a barrel?

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A farmer sold 37 bushels of corn for 18 dols. 50 cents: what was it a bushel?

Divide 37£. 0s. 6d. by 30.

What is the 4th part of 1000 dollars?

Byberry, 5 mo. 16th, 1809.

J. Townsend

to G. Gilbert, Dr.

£. s. d.

To ½ a ton of hay, at 7£. 10s. a ton.
½ a hundred of flour, at 1£. 17s. 6d. a Cwt.
¼ of a hundred rye meal, at 1£. 4s. a Cwt.

£.

Newton, 5 mo. 17th, 1809.

J. Cooper

Bo't of G. Jones;

D. c.

6½ yds. broadcloth, at $4, 50 a yd.
3⅛ yds brown cloth, at $1, 80 ——
6¼ yds. dowlass, at 36 cts. ——

$

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Philad. 6 *mo.* 1, 1809.

W. Thompson

Bo't of Wilson, & Co.

½ doz. spelling Books,	at	$2, 00	a doz.
1½ doz. Primers,	at	50	——
¾ doz. Arithmetics,	at	2, 40	——

$

REDUCTION.

Reduction is the bringing of a given sum or quantity from one name to another.

RULE.

When great names are to be brought to small, multiply;—when small names are to be brought to great, divide, by as many of the less, as make 1 of the next greater.

NOTE 1. All great names are to be brought into smaller by *multiplication*, as pounds into shillings, pence and farthings, by multiplying by 20, 12 and 4: or hundred weights into quarters and pounds, by multiplying by 4 and by 28, &c.

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NOTE 2. On the contrary, all small names are brought into greater by *division*; as farthings into pounds by dividing by 4, 12 and 20; and pounds weight into hundred weight, by dividing by 28 and by 4, &c.

EXAMPLES.

How many shillings in 13£.?

13
20
260

Pounds is a greater name than shillings, therefore *multiply* the pounds by as many shillings as make 1 pound, which is 20: the product is 260—the number of shillings in 13£.

In 320 shillings how many pounds?

2|0)32|0
£.16

Shillings to pounds, is bringing small names into great—therefore *divide* by as many shillings as make 1 pound: the quotient is 16—the number of pounds in 320 shillings.

How many shillings in 4£. *Ans.* 80*s.*

In 34£. how many shillings? *Ans.* 680*s.*

Bring 60 shillings to pounds. 3£.

How many pence in 2 shillings? *Ans.* 24*d.*

In 4 shillings how many pence? *Ans* 48*d.*

Bring 132 pence to shillings. 11*s.*

How many shillings and pence in 8£.
Ans. 160*s.* 1920*d.*

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In 14 pence how many farthings? *Ans.* 56*qr.*

How many shillings in 50 pence?
Ans. 4*s.* *and* 2*d.* *over.*

Bring 12£. into shillings, pence, and farthings. 240*s.* 2880*d.* 11520*qrs.*

Bring 2880 farthings into pence, the pence into shillings, and the shillings into pounds.
720*d.* 60*s.* 3£.

In 141£. how many pence? *Ans.* 33840*d.*

Bring 132£. to pence. 31680*d.*

Reduce 11£. to farthings. 19560*qrs.*

How many pounds in 21120 farthings?
Ans. 22£.

In 576 pence, how many pounds? *Ans* 2£. 8*s.*

In 4260 shillings, how many pounds? 213£.

Bring 361 shillings to pounds. 18£. 1*s.*

How many pence in 49 shillings? *Ans.* 588*d.*

Reduce 48£. 3s. 4d. into pence.

£.	*s.*	*d.*
48	3	4
20		
963*s.*		
12		
11560*d.*		

To be brought to a lower name, *multiply* the pounds by 20, because 20 shillings make 1 pound, and add the 3 shillings to the product, gives 963s. Then multiply 963s by 12, because 12 pence make 1 shilling—add the 4d. to the product, gives 11560—the number of pence in 48£. 3s. 4d

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Bring 2243 pence to pounds.

12)2243

2|0)18|6+11

9..6..11

To be brought to a higher name, *divide* the pence by as many pence as make 1 shilling, which is 12—the quotient is 186s. and 11d over. Then divide the shillings by 20, because 20 shillings make 1 pound: the quotient is 9£. and 6 shillings over: bring down the 11d. and it will be 9£. 6s. 11d.

In 1s. 4d. how many pence? *Ans.* 16*d.*

How many pence in 13s. 8d.? *Ans.* 164*d.*

Bring 4s. 6½d. into farthings. 218 *qrs.*

In 12£. 6s. how many shillings? *Ans.* 246*s.*

How many pence in 4 . 3s. 3d.? *Ans.* 999*d.*

How many shillings in 49£. 15s.? *Ans.* 995*s.*

Bring 72£. 16s. 3d. into pence. 17475*d.*

In 28£. 16s, 7½d. how many shillings, pence, and farthings? *Ans.* 576*s.*—6919*d.*—27678*qr.*

In 437 shillings how many pounds?
Ans. 21£. 17s.

In 8640 farthings how many pence, shillings and pounds? *Ans.* 2160*d.*—180*s.*—9£.

Bring 493 farthings into pence.
123*d.* 1*qr.*

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In 4645 pence how many pounds?
Ans. 19£. 7*s.* 1*d.*

Bring 8642 pence to pounds. 36£. 0*s.* 2*d.*

Reduce 160£. 15s 6d. to pence. 38586*d.*

In 916£. 10s 9¾d. how many farthings?
Ans. 879879*qrs.*

How many farthings in 6s. 9d. ½? *Ans.* 326*qr.*

In 1650 pence how many pounds?
Ans. 6£. 17*s.* 6d.

Bring 36£. 6s. 3½d. to farthings. 34862*qr.*

How many halfpence in 13£. 0*s.* 6*d.*?
Ans. 6252 *halfpence.*

In 35462 farthings how many pounds?
Ans. 36£. 18*s.* 9½*d.*

FEDERAL MONEY.

NOTE. To reduce pounds to dollars, multiply by 8, and divide by 3.

To bring dollars to pounds, multiply by 3, and divide by 8.

To bring pence to cents, set 0, to the right hand, and divide by 9.

To bring cents to pence, multiply by 9, and cut off the right hand figure of the product; the rest will be the per

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TROY WEIGHT.

Reduce 2627dwts to pounds.

2|0)262|7

12)131 7

10 11 7

Pounds are a greater name than dwts. therefore *divide* the number of dwts. by as many as will make 1 ounce, which is 20. The quotient is 131 ounces and 7 dwts. over. Then divide the ounces by 12, because 12 oz. make 1 lb. The quotient is 10lb. and 11oz. over, bring down the 7dwts. and it will be 10lb. 11oz. and 7 dwts.

How many ounces and pennyweights in 12 lb.

lb. *oz.*
12 8
12

152*oz.*
20

3040dwts.

To be brought to a lower name, *multiply* the lb. by 12, because 12*oz.* 1lb. then bring in the 8: it gives 152*oz.*—multiply by 20, because 20dwts. 1*oz.* the product is 3040dwts.

In 36*oz.* how many pounds? *Ans.* 3*lb.*

How many ounces in 6lb? *Ans.* 72*oz.*

How many ounces, pennyweights and grains, in 9lb. 9*oz.* 10*dwt.*?

Ans. 117*oz.*—2350*dwt.*—56400*gr.*

In 47128 grains, how many pounds?

Ans. 8*lb.* 2*oz.* 3*dwt.* 16*gr.*

Reduce 11*lb.* 3*oz.* 4*dwt.* 13*gr.* to grains.

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AVOIRDUPOIS WEIGHT.

In 6Cwt. 2qr. 20lb. how many quarters and pounds?

Cwt.	*qr.*	*lb.*
6	2	20
4		
26*qr.*		
28		
228		
52		
748*lb.*		

To be brought to a lower name, *multiply* the 6 Cwt. by 4, because 4qr. make 1Cwt. and add the 2 quarters to the product, gives 26qrs. Then multiply by 28, because 28lb. 1qr. and the 20lb. added in, gives 748lb.

How many hundred weight in 878lb.?

4

28)878()31

84

38

28

10

7 3 10

To be brought to a higher name, *divide*—first by 28, which brings it to quarters, then the quarters by 4 brings it to Cwt..

Ans. 7Cwt. 3qr. 10lb.

In 15 tons how many hundred weight?

Ans. 300*Cwt*

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Reduce 3Cwt. 1qr. 12lb. to pounds. 376*lb.*

How many quarters and hundred weight in 448lb.? *Ans.* 16*qr.*—4*Cwt.*

In 9Cwt. 0qr. 5lb. how many pounds?
Ans. 1013*lb.*

How many quarters in 24Cwt. 3qr.?
Ans. 99*qrs.*

In 3694lb. how many tons?

How many pounds in a barrel of flour which is said to contain 1Cwt. 3qr. 23lb.?

How many ounces and drams in 13lb?

Bring 14T. 13cwt. 3qr. 27lb. into pounds.

Required the number of tons in 97463lb.

Reduce seven hundred weight three quarters twenty one pounds to pounds.

In a barrel of sugar weighing two hundred and four pounds, how many parcels of half a dozen lb. each?

Bring 3 tons. 13cwt. into quarters and pounds.

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LONG MEASURE.

In 7L. 1m. 4fur. 8p. 1yd. 2ft. 6in. how many inches?

L.	*m.*	*fur.*	*P.*	*yd.*	*ft.*	*in.*
7	1	4	8	1	2	6
3						
22						
8						
180						
40						
7208						
$5\frac{1}{2}$						
36041						
3604						
39645						
3						
118937						
12						
1427250 *inches. Ans.*						

To be reduced to a lower name—multiply the leagues by 3, because 3 miles 1 league—the product is 21; to which add the 1 mile, gives 22M. Multiply 22 by 8, because 8 furlongs 1 mile, and adding in the 4fur. makes 180fur. multiply this number by 40, because 40 poles 1 furlong—adding in the 8 poles, it makes 7208p.—then because $5\frac{1}{2}$ yds. 1 pole—multiply first by the 5, and add in 1yd. then take half the 7208 or divide by 2—set it down under the product by the 5, and add them together—this gives 39645yds. which, multiplied by 3, because 3ft. 1yd. and adding in the 2ft. gives 118937ft.—multiply these by 12, because 12 in. 1ft. add in the 6in. and it gives 1427250 inches, the answer.

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How many perches in 341 yards?

11)341

31 double perches.
2

62 perches.

Yards to perches is bringing to a higher name, *divide*. But it being difficult to divide by 5½ the number of yards in a perch, take twice 5½ which is 11: divide by this, the quotient is just half the number of perches, therefore multiply it by 2, the product is 62; the number of perches in 341 yds.

In 8 miles how many furlongs and poles?

Ans. 64 *fur.*—2560 *poles.*

Reduce 704 perches to miles.

2 *m.* 1 *fur.* 24 *p.*

In 7 L. 1 m. 7 fur. how many furlongs?

Ans. 183 *fur.*

How many inches in 3 feet 11 inches?

How many yards in 139 inches?

In 3 yds. 2 ft. 6 in. how many inches?

CLOTH MEASURE.

How many quarters in 12 yds. 2 qr?

Ans. 50 *qr.*

Reduce 37 yds. 3 qr. 3 na. to nails.

607 *na.*

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In 161 quarters how many yards?

Ans. 40 *yds.* 1 *qr.*

Reduce 7 ells flemish to quarters.

21 *qr.*

Bring 19 ells English to nails.

380 *na.*

Bring 43 yards into half yards.

86 *half-yds.*

LAND MEASURE.

Reduce 27 acres 1 rood 32 per. into perches.

4392 *perches.*

In 4392 perches how many acres.

Ans. 27 *a.* 1 *r.* 32*p.*

How many perches in a plantation containing 136 acres and a half.

LIQUID MEASURE.

In 4 tons how many hogsheads?

Ans. 16 *hhds.*

How many pints in 3 hogsheads.

Ans. 1512 *pts.*

Bring 19152 pints to quarts, gallons, and hogsheads.

9576*qt.* 2394*gals.* 38*hhds.*

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DRY MEASURE.

In 17 bushels 5 quarts, how many pints?

Ans. 1098.

In 5054 pints, how many bushels?

Ans. 78 *bu.* 3 *pt.* 7*qt.*

Reduce 63 bushels 2 pecks 1 quart, into quarts.

TIME.

How many days in 12 weeks and 4 days?

Ans. 88 *days.*

How many minutes in a week?

Ans. 10080 *min.*

Reduce 37 weeks 5 days into minutes.

380160 *min.*

In 30240 minutes how many weeks?

Ans. 3 *wks.*

Reduce 1008 hours to weeks.

6 *weeks.*

How many minutes in a year?

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THE RULE OF THREE,

DIRECT.

The Rule of Three teaches, by having three given numbers or quantities called terms, to find a fourth, that shall have the same proportion to the third, as the second has to the first.

If *more* require *more*, or *less* require *less*, the question belongs to the rule of three direct.*

RULES FOR STATING.

1st. That term which we want to find an answer to, must be set in the *third* place.

2d. That which is of the same kind with the third term, must be set in the *first* place.

3d. That of the same kind with the answer, and which is sometimes the price of the first, must be set in the *second* place.

* The following rule would render the distinction of *direct* and *inverse* useless: write the number for the *third* term, which is of the same kind with the answer or number sought. Consider from the nature of the question, whether this *third* term is greater or less than the answer: and if greater, write the greater of the other two given numbers for the first term, and the less for the second: but if less, write the less for the first term, and the greater for the second, and the question is stated. If the first and second be not of one name, reduce each to the lowest in either, and the third also to its lowest name. Then the product of the second and third terms, divided by the first gives the answer, &c.

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EXAMPLES.

What will 25 yards of linen come to, at the rate of 35 cents for 1 yard?

yd. *ct.* *yd.*
If 1 .. 35 : : 25
25
175
70
1)875
$8,75 *Ans.*

In this example the three terms are 25yds. 35cts and 1yd:—we would find how much money the 25yds. come to;—therefore set 25yds. in the 3d place: the 1yd is of the same kind, therefore set it in the first place: then set the 35cts. which is the price of the yd. and of the same kind with the answer, in the second place. Put the respective signs over the numbers, and two dots between the first term and the second, and four dots between the second and third; the stating then may be read thus: If 1yd. come to 35 cents, how much will 25yds. come to? Then multiply 35cts. the second term, by 25yds. the third term—the product is 875;—which divided (for form's sake) by 1, the first term, gives 875 cents—the fourth term, or answer. Point off 2 figures for cents, and it will be $8, 75—the answer, or value of 25 yards.

If 1 bushel of salt cost 83 cents, what will 46 bushels cost? *Ans.* $38, 18.

At 13 cents for 1 pound of sugar, how much will 112lb. come to? *Ans.* $14, 56.

What cost 28 gallons of oil, at 56 cents a gallon? *Ans.* $15,

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If 8 yards of cloth cost 24s. what will 96 yards come to?

Yd.	*s.*	*yd.*
If 8 ..	24	: : 96
		24
		384
		192
		8)2304
		2\|0)28\|8
		£.14 8 *Ans.*

The 3 terms are 8yd. 24s. and 96yd. The 96 yards is the term we want an answer to—set it in the third place: 8yd. is of the same kind, set it in the 1st place: and 24s. which is of the same kind with the answer, set in the 2d place. Then multiply 96yds. the 3d term, by 24s. the 2d. term: the product is 2304, which divided by 8 the 1st term, gives 288, the answer in shillings—which being divided by 20, because 20s. make 1 pound—gives 14£. 8s. the answer, or value of 96yds.

If 8 bushels of salt cost 25s. what is the value of 40 bushels? *Ans.* 125*s.*

If 12 bushels of wheat be worth 16 dollars, how much is 48 bushels worth? *Ans.* $64, 00.

At 9 pence a pound, what does 24lb. of beef come to? *Ans.* 18*s.*

If 3lb. of ginger cost 3s. what cost 26lb. *Ans.* 1£. 6*s.*

How many barrels of pork may be purchased for $21, 00 when the price of 1 barrel is $7,00? *Ans.* 3 *barrels.*

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If 100lb. of cheese be bought at 15 cents a pound, what does it come to? *Ans.* $15, 00.

A man sold 125 bushels of wheat at 11s. 3d. a bushel; what did it come to?

B.	*s.*	*d.*		*B.*
If 1 ..	11	3	: :	125
	12			
	135			
	125			
	675			
	270			
	135			
1)16875				
12)16875 *pence.*				
2\|0)140\|6*s.* 3*d.*				
£.70	6	3		

The 3 terms are 125bu. 11s. 3d. and 1bu. It is required to know how much the 125bu. come to—set it in the 3d place: 1bu. is of the same kind—set 1 in the 1st. place, and the price of 1bu. which is 11s. 3d—set in the 2d place. Then, because the 2d term consists of shillings and pence, reduce it to pence by multiplying the 11s. by 12, because 12d. make 1s. add in the 3d, and it is 135d. multiply this by 125, the 3d term: the product is 16875. which divided by 1, the first term, gives 16875 for the answer in pence: divide by 12, because, 12d. make 1s.—brings 1406s. and 3 pence over. Divide the shillings by 20, because 20s. make 1£.—brings 70£. and 6s. over: bring down the 3d. and it will be 70£. 6s. 3d. the answer, or sum of money 125bu. of wheat comes to.

If 1lb. of coffee be worth 2s. 4d. what is the value of 46lb.? *Ans.* 5£. 7*s.* 4*d.*

If 12 yards of linen cost 1£. 16s. what will 192 yards come to? *Ans.* 28£. 16*s.*

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If 16lb. of sugar cost 1£. 12s. what is the value of 112lb.? *Ans.* 11£. 4s.

If 9s. buy 6lb. of sugar, how much sugar will 2£. 5s. buy at that rate? *Ans.* 30*lb.*

If 20 yards of cloth cost 120 dollars, how many yards may I have for 24 dollars? *Ans.* 4*yds.*

At 1s. 10½d. a pound, what cost 36lb of candles? *Ans.* 3£. 7*s.* 6*d.*

How much must be paid for 34 barrels of flour, if the price of 1 barrel be $7, 35?
Ans. $249, 90.

Bought 730lb. of cotton at 30 cents a pound: what does it come to? *Ans.* $219, 00.

What will 22lbs. of nails come to at 16½ cts. a pound? *Ans.* $3, 63.

If 12, or 1 dozen of Comly's Grammars be bought for $5, 00, how much would 27 come to? $11, 25.

At 7s. 6d. per bushel, how much will 19 bushels of rye come to? *Ans.* 7£. 2*s.* 6*d.*

If 1 shad cost 12½ cents, what will 30 shad come to at the same rate? *Ans.* $3, 75.

At 62½ cents a day, how much will a labourer earn in 25 days? *Ans.* $15, 62½.

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A ton of hay is worth $12, 50: what is the worth of 7 tons 12Cwt.

T.	*D. c.*	*T. Cwt.*
If 1 ..	12,50 ::	7 12
20	152	20
20	2500	152
	6250	
	1250	
2\|0)19000\|0		
$95,00		

The third term consisting of tons and hundred weights,—both it and the first term must be reduced to Cwt. by multiplying by 20—because 20Cwt. make 1 ton. Then multiply the second and third terms together—the product is 190000: which dividing by the first term 20, gives 9500. Point off 2 figures for cents, and it will be $95, 00—the answer; or sum of money which 7T. 12Cwt. of hay is worth.

What will 7Cwt. 3qr. of iron come to, at $8, 75 per hundred weight? *Ans.* $67, 81¼.

An acre of land is valued at 15*£*. 10*s*. 6*d*.: what will be the value of 13 acres 2 roods 25 perches? *Ans.* 212*£*. 0*s*. 3*d*.

If 1lb. of sugar cost 9d. what cost 17Cwt. 2qrs.? *Ans.* 73*£*. 10*s*.

A man bought a piece of cloth containing 13 yards 2qrs. for $27, 00: what was it a yard? *Ans.* $2, 00.

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Bought a cheese weighing 35 pounds and a half, for 18 cents a pound; what did it come to?
Ans. $6, 39.

If 112lb. of sugar cost 5£. 2s. 8d.: what will 1lb. cost. *Ans.* 11*d.*

At 16 cents a pound, what does 49lb. of flax come to? *Ans.* $7, 84.

If 2 penknives cost 4 shillings, what will a dozen penknives cost? *Ans.* 1£. 4*s.*

If 96lb. of sugar cost 3£. 12s. what is it a pound? *Ans.* 9*d.*

At 15d. a pound, what is loaf sugar a hundred weight? *Ans.* 7£.

Sold 3Cwt. of tobacco at 18d. a pound: what is the amount? *Ans.* 25£. 4*s.*

If 100lb. of pork be worth $6, 50, what is 1364lb. worth? *Ans.* $88, 66.

Bought 116 bushels of corn for $58, 00: what was the price of 1 bushel? *Ans.* 50*cts.*

Land at $18, 25 an acre, what is the value of 50A. 2R. 20P.? *Ans.* $923, 90 6+

What will 421 bushels of wheat come to, at $1, 33 a bushel? *Ans.* $559, 93.

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If 72 yards of linen cost 5£. 8s. what will 168 yards come to at that rate? *Ans.* 12£. 12*s.*

One dollar is 7s. 6d.: how much in like money is 372 dollars? *Ans.* 139£. 10*s.*

Eight dollars make 3£.: how many pounds in 1300 dollars? *Ans.* 487£. 10*s.*

Nine pence make 10 cents: how many cents will 63 pence make? *Ans.* 70 *cents.*

If a person pay 3 dollars a week for his board, what must he pay for 5 weeks and 4 days? *Ans.* $16, 71.

A person failing in trade, finds he can pay his creditors but 65 cents for a dollar: what can he pay at that rate to a man to whom he owes 465 dollars? *Ans.* $302, 25.

If 18 bushels of wheat be bought for 8£. 16s. 6d. what would 426 bushels come to at that rate? *Ans.* 208£. 17*s.* 2*d.*

At 2£. 5*s.* a Cwt. what does 12Cwt. 3qr. 11lb. of rye meal come to?

Tell the price of 23T. 7Cwt. 2qr. of hay, at $12, 25 a Cwt.

What does 6½ yards of Russia linen come to at 4s. 6d. a yard?

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What does a bag of potatoes containing 3 bushels 3 pecks come to, at 4s. 7d. a bushel?

Tell the price of a keg of raisins containing 39½lbs. at 14½ cents a pound.

What should a man receive for 8½ days labour, at $1, 25 a day?

At 9d. a pound how many pounds of sugar may be bought for 29£. 16s. 4½d.?

What quantity of wood may be purchased for 300 dollars, at $4, 50 a cord?

Bought 6 hogsheads of sugar, each 6Cwt. 3qr. at 56s. a Cwt.: what come they to?

Ans. 113£. 8s.

A man bought a piece of cloth for 16£. 10s. at 15s. a yard, how many yards did it contain? *Ans.* 22*yds.*

What must be given for 7 yards. 3qr. 2na. of silk, at 6 dollars a yard? *Ans.* $47, 25.

If 17T. 12Cwt. of iron cost 165£. what is that for 2Cwt.? *Ans.* 18*s.* 9*d.*

If coffee be sold for 2s. 3d. a pound, what is 6Cwt. worth?

If I pay 6 cents a mile for stage fare, how I ride for 20 dollars?

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If 36*oz.* 10*dwt.* of silver be worth 9*£.* 2*s.* 6*d.* what is that an ounce?

THE RULE OF THREE,

INVERSE.

The Rule of Three inverse, is when *more* requires *less*, or *less* requires *more*.

RULE.

Multiply the first and second terms together, and divide the product by the third: the quotient will be the fourth term or answer.

EXAMPLES.

If 4 men can perform a piece of work in 6 days, how long will it take 8 men to do the same piece of work?

M. *d.* *M.*
If 4 .. 6 :: 8
4
—
8)24
—
3 *days.*

State the terms as in the Rule of Three direct—multiply the first and second together: the product is 24. Divide by the third—the quotient (3 days) is the answer.

How many men must be employed to finish a piece of work in 15 days, which five men can do in 24 days? *Ans.* 8 *men*

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In how many days will 8 men finish a piece of work, which five men can do in 24 days?

Ans. 15 *days.*

If a footman perform a journey in 3 days, when the days are 16 hours long, how many days will he require of 12 hours long to perform the same in? *Ans.* 4 *days.*

If 6 men can reap a field of wheat in 12 days, in what time will 24 men do it? *Ans.* 3 *days.*

How much in length, that is 4½ inches broad, will make a square foot? *Ans.* 32 *inches.*

How many yards of matting 2 feet 6 inches broad, will cover a floor that is 27 feet long and 20 broad? *Ans.* 72 *yards.*

How many yards of cloth 3qrs. wide, are equal in measure to 30yds. of 5qrs. wide?

Ans. 50 *yards.*

PRACTICE.

Practice is a short method of finding the value of any number of pounds, yards, gallons, &c. when the price of a single pound, yard, &c. is given.

GENERAL RULE.

Take such part or parts of the given number as the price is of a penny, shilling, pound, or dollar, for the answer in pence, shillings, pounds, dollars; accordingly.

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TABLES.

qr.	of 1*d.*
1	¼
2	½

d.	of a shilling.
1	1/12
1½	1/8
2	1/6
3	¼
4	⅓
6	½

C.	of a dollar.
50	½
25	¼
12½	1/8
10	1/10
5	1/20

s.	*d.*	of a pound.
1	0	1/20
1	8	1/12
2	0	1/10
2	6	1/8
3	4	1/6
4	0	¼
5	0	
6	8	⅓
10	0	½

NOTE. The sums wrought by the Rule of Practice, may also be done by Compound Multiplication, or the Rule of Three direct.

EXAMPLES.

What will 894lbs. of chalk come to at ½ penny a pound?

qrs.		*lbs.*	
½	¼	894	
	12	447	pence.
	2\|0	3\|7	3
		£.1	17 3

First set down 894, the number of lbs. The price of 1lb. is 2 farthings or the half of a penny: make 2 columns on the left of the number, set the 2qrs. in the one, and ¼ to denote that it is the half of a penny, set in the other next to the number. Take the half, or divide the 894 by 2; the quotient 447, is the number of pence the 894lbs. of chalk come to at ½ penny per lb. Dividing the 447d. by 12 gives 37

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and 3d. Dividing the 37s. by 20, gives 1£. 17s. to which bring down the 3d. and it is 1£. 17s. 3d. the answer.

The reason is plain, for if the price of the chalk had been 1d. it would have come to just as many *pence* as lbs. that is 894: but as it is half that price, therefore it will amount to just half that number, or 447 pence.

Find the price of 800 quills at 2 farthings or a half penny a piece. 1£. 13s. 4d.

At 1 farthing a yard, what must be given for 672 yards of tape? *Ans.* 14s.

What will 849lbs. of beef come to at 6d. a pound?

d.		*lb.*			
6	½	849			
	2\|0	42\|4	6		
	£.	21	4	6	*Ans.*

6d. the price of 1lb. is just ½ a shilling: dividing 849 the number of lbs by ½ or 2, gives 424 which is the number of shillings, 849lbs. come to at 6d. a lb. and 1 *half* shilling or 6 pence over. Divide by 20, to bring the shillings to pounds, the answer is 21£. 4s. 6d.

At 4d. per pound, what will 640lb. of meat come to? *Ans.* 10£. 13s. 4d.

At 3d. a quart, how much for 120 quarts of cider? *Ans.* 1£. 10s.

How much will 49lbs. of cheese come to at 5½d a pound?

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d.		*lb.*		
6	½	49		
3	¼	—		
		24	6	
		12	3	
	2\|0	3\|6	9	
		£.1	16	9 *Ans.*

As the price is less than 1s. take the parts of a shilling: and as ½ is the greatest part, first find what 49lb. come to at half a shilling or 6d. a lb. which is 24s. 6d. Then as 9d. is 3d. more than 6d. find what 49lbs. come to at 3d. a lb. which is 12s. 3d: add the two sums together, the amount is 36s. 9d. Bring the 36s. to pounds, and it will be 1£. 16*s.* 9*d.* the answer.

By Compound Multiplication:

d.
9
7 times 7 is 49.

5 3 7lb. come to
7

£.1 16 9 7times 7 or 49lbs. come to.

By the Rule of Three:

lb. *d.* *lb.*
If 1..9::49
9

1)441

12)441 *Ans.* in pence.

2|0)3|6 9

£.1 14 9 *Ans.*

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At 10d. a yard what will 60 yards of muslin come to? *Ans.* 2£. 10*s.*

How much for 100 English quills at 2 pence a piece? *Ans.* 16*s.* 8*d.*

What will 121 yards of linen come to at 1s. a yard? *Ans.* 6£. 1*s.*

Find the price of 313lbs. of cotton, at 25 cts. a pound.

Cts.		*lb.*	
25	¼	313	Twenty five cents is one fourth of a dollar, divide the number of pounds (313) by 4, gives 78 dols. and one fourth, or 25 cents the price of 313 pounds.
		$78,25	

By Multiplication:

Multiply 313 lb.
By the price 25*cts.*

1565
626

In the product point off two figures for cents, and it is $78,25

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By the Rule of Three:

lb.	*cts.*	*lb.*
If 1	: : 25	: : 313

25

1565

626

1)7825

7825 cents or $78,25

At a half a dollar a bushel, what will 150 bushels of potatoes come to? *Ans.* $75,00.

At a quarter of a dollar a pound, what will 19lbs. of butter come to? *Ans.* $4,75.

What will 300lbs. of wool come to at 3s. 4d. a pound?

s.	*d.*		*lb.*
3	4	$\frac{1}{6}$	300

50£. *Ans.*

Three shillings and four pence is one sixth of a pound; divide 300 by 6, gives 50£. the answer.

Or multiply by the shillings, and take parts for the pence.

d.		
4	$\frac{1}{3}$	300
		3
		900*s.*
		100
2\|0		100\|0

50£. *Ans.*

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By Compound Multiplication:

s.	*d.*	
3	4	
		10 times 10 is 100.
1	13	4
		10
£.16	13	4 price of 100lb.
		3 times 100 is 300.
£.50	0	0 price of 300 lbs.

By the Rule of Three:

lb.	*s.*	*d.*		*lb.*
If 1	: 3	4	: :	300
	12			40
	40			1)12000
				12)12000 pence.
				2\|0)100\|0 shillings.
				£. 50 *Ans.*

At 4s. a day, what will a labourer demand for 24 days work? *Ans.* £.4 16*s.*

Bought 38 bushels of lime at 2s. a bushel, what did it come to? *Ans.* £.3 16*s.*

What will 29 yards of dowlas come to at 50 s a yard? *Ans.* £14, 50.

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At 6s. 8d. a bushel, what will 672 bushels of rye come to? *Ans.* £.224.

At 10 shillings a yard, what may 45 yards of cloth be purchased for? *Ans.* £.22 10*s.*

Find the price of 99lbs. of butter at 1s. 8d. a pound. *Ans.* £.8 5*s.*

At £.1 15*s.* a cord, what will 27 cords of wood come to?

s.		*c.*		
10	½	27		
		1		
5	¼	27		
		13	10	
		6	15	

£.47 5 *Ans.*

By Compound Multiplication:

£.	*s.*
1	15

3 times 9 is 27.

5	5
	9

£.47 5 *Ans.*

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By the Rule of Three:

C.	£.	s.	C.
If 1	1	15	: : 27

20

35

27

245

70

2|0)945

2|0)94|5

£.47 5 *Ans.*

At 25 cents a yard, how much will 315 yards of muslin come to? *Ans.* $78, 75.

What will 456 bushels of corn come to, at half a dollar a bushel? *Ans.* $ 228, 00.

At 7s. a piece, what will seven scythes come to? *Ans.* 49s.

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What is the value of 140 acres of land at £.15 12*s.* 6*d.* an acre?

s.	*d.*	*d.*		
10	0	½	140	Multiply by the 15£. take parts for 10s. and for 2s. 6d.
2	6	⅛	15	
			700	
			140	
			£.2100	at £15 per acre } add these together.
			70	at 10s. }
			17 10	at 2s. 6d. }
			£.2187 10	*Ans.*

By Compound Multiplication:

	£.	*s.*	*d.*	
140 acres at	15	12	6	× 8
			11	times 12 is 132 & 8 more is 140.
	171	17	6	
			12	
	2062	10	0	value of 132 acres.
	125	0	0	ditto 8 acres.
£.	2187	10	0	value of 140 acres.

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By the Rule of Three:

A. *£.* *s.* *d.* *A.*

If 1..15 12 6 :: 140

20

312

12

3750

140

150000

3750

1)525000

12)525000 pence.

2|0)4375|0 shillings.

*£.*2187 10*s. Ans.*

What will 178 Cwt. of sugar come to at 2*£.* 4*s.* a cwt. *Ans.* 391*£.* 12*s.*

At 17*s.* 9*d.* a yard, what is the price of 24 yards of cloth? *Ans.* 21*£.* 6*s.*

At 9*s.* 4½*d.* a bushel, what will 740 bushels of wheat come to? *Ans.* 346*£.* 17*s.* 6*d.*

If a ton of hay be sold for 12 dollars and a quarter, how much will twenty-one tons come to? *Ans.* $257, 25.

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Find the price of a keg of butter, weighing 38lb. at 20 cents a pound. *Ans.* $7, 60

At one dollar a gallon, what must be given for 31 gallons of wine? *Ans.* $31, 00

At 4d. per foot, what will 8120 feet of boards come to? *Ans.* 135*£*. 6*s*. 8*d*.

What is the amount of a bill of scantling containing 4760 feet, at 2d. a foot. *Ans.* 39*£*. 13*s*. 4*d*.

What will 1374lbs. of pork come to at 7½d. a pound?

At a quarter of a cent per quill, what must be given for 9650 quills?

If tea be bought at one dollar and a quarter a pound, what must be given for 3 pounds?

Coffee at 27 cents, what will 35lbs. come to?

At 9s. 9½d. a gallon, what will six gallons of wine come to?

Find the value of 1739 lbs. of rice at 2½ cents a pound?

What must be given for 309lbs. of nails at 12½ cents a pound?

At 6¼ cents a pound, what will 374lb. of tobacco come to?

Find the price of six yards of cloth at $6, 75 a yard?

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At four dollars and three quarters a yard, what will a piece of cloth containing 30 yards come to?

Tell the price of a ton of hay at 57 cents a hundred weight?

Required the price of a tierce of molasses at 60 cents a gallon?

What must be given for 3 yards and a half of silk at $ 1, 50 a yard.

At one dollar and three quarters a day, what would a man earn in a week.

INTEREST.

Money, lent to be received again, with an allowance for the use of it from the borrower, is at *interest.*

The sum of money lent, is called the *principal.*

That received for the use of the money, is called the *interest.*

The principal and interest added together, is the *amount.*

The *rate per cent* is the interest of 100£. or 100 dollars for one year.

The easy method of calculation by dollars and cents, being generally adopted, the interest

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of any sum of money may be obtained by the following

RULE.

Multiply the principal in dollars, by the rate per cent; the product is the interest in cents for one year, which multiply by the number of years for which interest is required.

If the time consists of months, take parts therefor as in practice. If the interest for days be required, work by the rule of three, thus: as 365 days, is to the *interest* for a year, so is the *number* of days, to the *interest* therefor.

NOTE. If a part of the principal be in cents, multiply as when there are dollars only; cut off the right hand figure in the product, the rest will be mills.

EXAMPLES.

Required the interest of 375 dollars for one year and three months, at 6 per cent. per annum?

375 principal.
6 rate per cent.

m.		
		22,50
3	¼	5,625

28,125 interest.
375,000

$403,125 amount.

Multiply the principal, 375 dollars by 6, the rate per cent; the product is 2250, which is the interest in cents for 1 year; point off two figures for cents, the rest are dollars.—Then because 3 months is one fourth of a year, divide the interest for a year by 4, the quotient $5,625, shews the interest for three months,

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which add to that for a year, the total interest is 28,12,5, add the principal 375 dollars, and we have the amount $403.125.

Find the interest of $ 324,50 for 5 years, 4 months and 25 days, at 7 per cent. per annum.

324 50 principal.
7 rate per cent.

m.		
4	1/3	$22,71 50 interest for 1 year.
		5 years.
		113,575 interest for 5 years.
		7,571 ditto 4 months.
		1,555 ditto 25 days.
		$122,701 ditto for 5 years 4 mo. 25 days.

To find the interest for 25 days.

D. *D.* *C.* *d.*
365 : 22.715 : : 25
25

113575
45430
365) 567875(1,555
365
202

What is the interest of $82 for 2 years and 6 months at 6 per cent. per annum? *Ans.* $12, 30.

Calculate the interest on 649 dollars, for four at 6 per cent. per annum. $155, 76.

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Find the interest of 240 dollars for 6 months at 6 per cent per annum? $7, 20.

Required the interest on a bond, for $1472 at 5 per cent. per annum, for 3 years and nine months? $276.

What is the interest and amount of a bond for 730 dollars for 6 months, at 6 per cent per annum? *Ans.* Interest $21, 90.
Amount $751, 90.

Calculate the interest and amount of a bond for 238 dollars for 6 years and 5 months, at 7 per cent. per annum? Interest $106, 89.
Amount $344, 89.

A note for $125, 50 was dated the 25th of the third month, 1808, and taken up the 25th of the 5th month, 1809; what did it amount to, interest reckoned at 6 per cent. per annum?
Ans. $134, 285.

A bond for $1250, dated the 13th of the 6th month, 1806, and taken up the 3d of the 4th month, 1809, what was the interest thereon at 6 per cent per annum, and what the amount?
Ans. Interest $210, 35.
Amount $1460, 35.

Find the interest on $35, 42, for 1 year and 11 months, at 7 per cent. per annum? $4, 75.

To calculate the interest of the old currency or English money, multiply the principal by the

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rate per cent. and divide by 100, the quotient will be the interest for 1 year. For months or days proceed as before directed.

EXAMPLES.

What is the interest of 57*£*. 17s. 8d. for 3 months, at 6 per cent per annum?

£.	*s*.	*d*.	
57	17	8	*principal.*
		6	*rate per cent.*

£.3|47 6 0
20

s. 9|46
12

d. 5|52
4

qr. 2|08

m.	*£*.	*s*.	*d*.
3\|$\frac{1}{4}$\|	3	9	5$\frac{1}{2}$
		17	4$\frac{1}{4}$ *Ans.*

Multiply the principal by the rate per cent, like compound multiplication: the product is 347*£*. 6s. 0d. Divide by 100, that is, (for the sake of shortening the work) cut off the two right hand figures of the pounds, that on the left is 3*£*.:—then those on the right, which are a remainder, multiply by 20, (because 20s. make 1*£*.) and bring in the 6s. which makes 946s: cut off the two right hand figures, leaving the 9s. Multiply the figures cut off by 12 (because 12d. make 1s.) 0 to bring in—the product is 552d.: cut off two right hand figures, leaving the 5d. Multiply the figures cut off by 4, (because 4 farthings make 1 penny) the product is 208qr.: cut off two right hand figures, leaving the 2qr. Thus the interest of 57*£*. 17s. 8d. for 1 year is found to be 3*£*. 9s. 5$\frac{1}{2}$d.: the fourth part of which, as 3 months is the fourth part of a year, is 17s. 4$\frac{1}{4}$d. which is the answer.

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What is the interest of 87£. 14s. 5d. for 1 year, at 6 per cent. per annum? *Ans.* 5£. 5s. 3d.

What is the amount of 173£. 17s. 8½d. for a year, at 7 per cent. per annum?

Ans. 186£. 1s. 1¾d.

What is the amount of a bond for 176£. 13s. 9d. at the end of 9 years, at 5 per cent. per annum? *Ans.* 256£. 3s. 11¼d.

An uncle left by will to his niece 1256£. 15s. 6d. at the time of her marriage, there was 7 years interest due on the legacy, at 6 per cent. per annum: what sum must her executor pay?

Ans. 1784£. 12s. 4½d.

What is the interest of 100£. from the 5th of the 7th month, 1807, to the 9th of the 1st month, 1808, at 6 per cent. per annum?

Ans. 3£. 1s. 4¾d.

How much interest at 7 per cent. on $420, 40 from October 3d, 1806, to October 3d, 1808, and what is the amount? *Ans. Interest* $58, 85 6.

Amount $479, 25 6.

How much is the interest of 514£. from the 4th of the third month, 1806, to the 19th of the 10th month, 1808, at 5 per cent per annum?.

Ans. 67£. 8s. 11¼d.

Find the interest on 545 dollars, from the 8th of the first month, 1803, to the 20th of the 5th month, 1809, at 6 per cent. per annum; and also tell what is the amount.

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PROMISCUOUS QUESTIONS.

A man was born in the year 1762: in what year was he 40 years of age? *Ans.* 1802.

Received at one time 4200 dollars, at another 426: how many dollars in all? *Ans.* 4626.

Bought a bale of cloth containing 126 yards, of which I sold 79 yards: how many are left? *Ans.* 47 *yds.*

Sold 6 barrels of flour at $6, 75 a barrel: what did it amount to? *Ans.* $40, 50.

In a bale of muslin there are 16 pieces: in each piece are 24 yards: what number of yards in the bale? *Ans.* 384 *yd.*

If a barrel full of flour weighs 204lb. and the weight of the barrel is 12lb. what is the weight of the flour? *Ans.* 192lb.

Reduce 3£. 16s. 9½d. to farthings. 3686*qr.*

What is the 16th part of 48£.? *Ans.* 3£.

Bought a piece of linen containing 21 yards, for $10, 50: what was it per yard? *Ans.* 50*cts.*

What must be given for a dozen pounds of coffee, at 31 cents a pound? *Ans.* $3, 72.

Suppose a miller has 32340lb. of flour, how many barrels of 196lb. each, may he fill out of his flour? *Ans.* 165;

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What will half a dozen Testaments cost, at 3 dollars a dozen. *Ans.* $1, 50.

At 6d. a pound, what must be paid for 1 hundred weight of iron? *Ans.* 2£. 16s.

What will 46½ bushels of coals come to, at 37½ cents a bushel? *Ans.* $17, 43¾.

Three loads of hay weighed each 17Cwt. 3qr. 19lb.: how much in the three loads?
Ans. 2*T.* 13*Cwt.* 3*qr.* 1*lb.*

What will 480 dollars amount to in 1 year, interest at 5 per cent.? *Ans.* 504*dols.*

Bought 476 acres 3 roods 28 perches of land, at 3£. 7s. 11d. per acre: the value thereof is required. *Ans.* 1619£. 11s. 1¾d.

Sent 1900 dollars to the bank: and having drawn at one time $237, 75—at another $116, 09: and at another $241, 06½: what further sum may I draw for? *Ans.* $405, 09½.

Bring 75£. 12s. 4½d, to Federal money?
$201, 65.

In 40 acres 26 poles, how many poles?
Ans. 6426.

What sum will gain as much interest in 9 months, as 1000£. will gain in 12 months?
Ans. 1333£. 6*s.* 8*d.*

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If 15½ acres of land is worth $259, 62½, what is 1 acre worth? *Ans.* $16, 75.

A bond was dated the 13th of the 2d month, 1799, and taken up the 1st of the 1st month, 1809, for what time must interest be computed thereon?

Bought a horse for one hundred dollars, and sold him again for eighty four dollars and three quarters: how much was lost by dealing?

Dickins has an account on Perkins, for $160, 13: against which Perkins has an account for $83, 29: what is the ballance between them?

At 9s. 4d. a yard, what will 3yd. 3qr. 2na. of silk come to?

What is the interest of 2324 dollars for 54 days, at 6 per cent?

What will 721 dollars amount to, in 14 months, at 6 per cent?

Sold 30 Tons 18 Cwt. of iron at $55, 50, per ton, what was the amount?

One barrel of flour weighs 1Cwt. 3qr.; how much does 54 barrels weigh?

In 1 window there are 16 lights of glass, how many lights in 9 windows of the same kind?

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Out of 7£. 10s. take 3£. 16s. 9½d. and tell what remains.

Bring 3£. 10s. 6d. to Federal money.

In a certain tract of land there are 7464 acres, and it is to be divided into 40 plantations: what quantity will be in each of them?

If 1 yard of cloth cost 14s. 2d. what must be given for 9 pieces, containing each 21yds. 1qr.?

How many pounds of sugar at 13 cents a pound, may be bought for $3, 12?

DUODECIMALS.

Duodecimals are fractions, or parts of a foot, inch, &c. and are used by workmen and artificers in taking the dimensions, and casting up the contents of their work.

The denominations are:

12 Fourths ""	make 1 Third '''
12 Thirds	1 Second ''
12 Seconds	1 Inch, *In.*
12 Inches	1 Foot, *Ft.*

NOTE. The foot in this table is a square foot, that is, 12 inches long and 12 inches wide—the inch is the twelfth part of a square foot—that is 1 inch wide and 12 long—and the second is 1 square inch.

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ADDITION OF DUODECIMALS.

Add as in Compound Addition, carrying 1 for each 12, to the next.

Ft.	*in.*	″	‴	⁗
16	4	6	9	1
73	7	5	2	9
27	9	7	3	8
82	2	4	8	6
32	7	10	11	4
96	9	3	10	9

Ft.	*in.*	″	‴	⁗
28	4	6	3	6
71	7	5	8	6
82	4	9	8	9
17	7	2	3	3
67	8	9	7	10
46	7	0	0	9

In one piece of timber is 16ft. 3in. 3″; in another, 24ft. 9in. 7″ 3‴; and in another 34ft. 10in. 11″ 8‴: how much in all of them?

Ans. 75*ft.* 11*in.* 9″ 11‴.

SUBTRACTION OF DUODECIMALS.

Work as in Compound Subtraction, borrowing 12 when necessary.

Ft.	*in.*	″	‴	⁗
74	3	4	7	6
19	4	8	8	10

Ft.	*in.*	″	‴	⁗
100	5	8	4	6
97	8	9	10	11

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From a board which measured precisely 39ft. 7in. 4″ having cut off a part measuring 14ft. 11in. 6″ what was left? *Ans.* 24*ft.* 7*in.* 10.

MULTIPLICATION OF DUODECIMALS, OR CROSS MULTIPLICATION.

Work as in Compound Multiplication, observing, that

Feet multiplied by feet, give feet.
Feet multiplied by inches, give inches.
Feet multiplied by seconds, give seconds.
Inches multiplied by inches, give seconds.
Inches multiplied by seconds, give thirds.
Seconds multiplied by seconds, give fourths.

Or, set the feet of the multiplier under the lowest denomination of the multiplicand, and in multiplying, carry 1 for every 12; placing the result of the lowest denomination in the multiplicand, under its multiplier.

Or, multiply by the feet, and take parts for the inches.

Or, bring both the multiplicand and multiplier into inches. Multiply—the product will be seconds; which divide by 12 to bring them to inches, and the inches by 12 to bring them to feet.

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EXAMPLES.

	Ft.	*in.*	
Multiply	7	3	
by	4	7	
	29	0	
	4	2	9
	33	2	9

First, multiply the 7ft. 3in. by the 4ft. (which gives feet and inches,) 4 times 3 is 12 set down 0 and carry 1: then 4 times 7 is 28, and 1 is 29;—which set down. Next multiply the same 7ft. 3in by 7 inches, which gives inches and seconds—7 times 3 is 21: set down 9 seconds, and carry 1 inch; then 7 times 7 is 49 and 1 is 50, which is inches, or 4ft. 2in. set them down: then add them together, and the whole is 33ft. 2in. 9″.

Ft.	*in.*	
7	3	
	4	7
4	2	9
29	0	
33	2	9

By the second method: Set the 4ft. under the 3in. and the 7in. further to the right. in the place of seconds: then multiply by the 7in —7 times 3 is 21, which as the 7 stands in the place of seconds, we call seconds, or 1in. 9″—set down 9 and carry 1: 7 times 7 is 49, and 1 is 50, which is inches, or 4ft. 2in. which set down. Then multiply by the 4ft.—4 times 3 is 12, which is 1ft.—set down 0, and carry 1: 4 times 7 is 28, and 1 is 29, which set down. Add them together—the whole is 33ft. 2in. 9″ as before.

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in.		*Ft.*	*in.*	
6	½	7	3	
1	1		4	
		29	0	
		3	7	6
			7	3
		33	2	9

By the 3d method: Multiply by the 4 feet as before; then for the 7in. take parts of the 7ft. 3in. thus: 6in. is the half of a foot, take the half of 7ft. 3in. which is found to be 3ft. 7in. 6"—then for the 1in. more, which makes the 7, say 1in. is the twelfth part of a foot: divide 7ft. 3in. by 12, gives 7in. 3". Add them all together—the amount is 33ft. 2in. 9"—the same as before.

Ft.	*in.*	*Ft.*	*in.*
7	3	4	7
12		12	
87*in.*		55*in.*	
55			
435			
435			
12)4785			
12)398	9		
33	2	9	

By the 4th method: bring the 4ft. 7in. into inches, by multiplying by 12, (because 12 inches make 1 foot) multiply these inches together—the product is 4785 seconds. Bring these to inches, & the inches to feet: the result is 33ft. 2in. 9" as before.

	Ft.	*in.*	*Ft.*	*in.*	*Ft.*	*in.*
Multiply	5	8	9	7	8	3
by	4	6	9	7	6	4

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	Ft.	in.	Ft.	in.	Ft.	in.
Multiply	9	9	8	7	12	6
by	3	11	4	0	7	3

	Ft.	in.	Ft.	in.	Et.	in.
Multiply	17	4	13	9	29	1
by	9	3	16	4	20	3

	Ft.	in.	Ft.	in.	Ft.	in.
Multiply	131	9	321	11	664	10
by	114	7	115	3	218	7

	Ft.	in.	"	Ft.	in.	"
Multiply	13	7	4	19	4	7
by	6	3	0	9	3	0

	Ft.	in.	"	Ft.	in.	"
Multiply	18	6	3	17	3	8
by	9	4	9	4	6	4

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How many square feet in a board 17 feet 7 inches long, and 1 foot 5 inches wide?

Ans. 24*ft.* 10*in.* 11″.

A board 1 foot 3 inches wide, and 24 feet long, how many feet therein? *Ans.* 30 *feet.*

Suppose a board be 14 feet long, and 15 inches broad, what is the content thereof?

Ans. 17*ft.* 6*in.*

A piece of walnut is 6ft. 3in. 6″ long, and 2ft. 3in. 6″ wide: required its content.

Ans. 14*ft.* 5*in.*+

A mahogany board is 23ft. 3in. long, and 3ft. 6in. wide: how many feet does it contain?

Ans. 81 *ft.* 4*in.* 6″.

A certain room is 14ft. 4in. by 16ft. 6in. how many feet of boards are there in the floor of it?

DIVISION OF DUODECIMALS.

Duodecimals are divided like other compound quantities; though it is frequently as convenient to reduce them to the lowest name mentioned, and divide as in simple division.

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EXAMPLES.

Ft.	*in.*	″		*Ft.*	*in.*	″
2)47	7	10(		6)123	4	8(
12)76	2	4(		24)87	10	0(

4/ Divide 17ft. 4in. 10″ by 36.

5in. 9‴ 7⁗ 4⁗′.

A board measuring 27ft. 4in. is to be divided into 4 equal parts: what will be the quantity in each part? *Ans.* 6*ft.* 10*in.*

APPLICATION.

Four floors in a certain building contain each 1084ft. 9in. 8″; how many feet are there in all? *Ans.* 4339*ft.* 2*in.* 8″.

Six boards measure as follows: 27ft. 3in.—25ft. 11in.—23ft. 10in.—20ft. 9in.—23ft. 6in.—and 13ft. 5in.—how many feet do they contain? *Ans*, 134*ft.* 8*in.*

From a board measuring 39ft. 4in. 8″, cut 21ft. 10*in.* 9″, what remains?

Ans. 17*ft.* 5*in.* 11″.

Bought a raft of boards, containing 59621ft. 8in. of which were sold three parcels, each 14905ft. 5in. how many feet were remaining?

Ans. 14905*ft.* 5*in.*

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A partition is 82ft. 6in. by 13ft. 3in. how many yards of yard wide paper will cover it?

Ans. 121. *yds.* 4*ft.* 1*in.*

What is the 6th part of 39ft 3in.?

Ans. 6*ft.* 6*in.* 6″.

NOTE 1. In measuring boards, &c. it frequently happens that they are found to be wider at one end than the other, in such cases it is usual to take the width in the middle—or, which results in the same thing, add the width at one end to the width at the other—and take half their sum for, the mean width—which multiply by the length.

A board is 14 inches wide at one end and 16 at the other, and its length 13 feet 6 inches, how many feet will it measure?

```
        14
        16
        --
½ |     30
        --
   15 in. or 1 ft. 3 in.
   ft.  in.
   13   6
        1   6
   ---------
   13   6
    6   9   0
   ---------
   20   3   0  Ans.
```

Add the 14 and the 16 inches together, their sum is 30. take the half of 30, which is 15in. or 1 ft. 3 in. for the mean width: multiply the length 13 ft. 6in. thereby—the product is 20ft. 3in. 0″ the content or answer.

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What number of feet in a board 24 feet in length, 18 inches wide at one end and 9 at the other? *Ans.* 27 feet.

How many feet in a board 31 feet long, 12 inches wide at one end and 20 at the other?

A board is 2 feet 11 inches at the wide end, and 2 feet 5 inches at the other; its length 25 feet 10 inches, how many feet does it contain? *Ans.* 68ft. 10in. 8".

NOTE 2. The common thickness of boards is 1 inch, and therefore they are measured superficially; plank and square timber are generally reduced to board measure thus:—multiply the length by the breadth, which gives superficial content;—this increased as many times as there are inches in the thickness—gives the quantity in board measure—or the number of feet of inch boards that might be made thereof, allowing for no waste in sawing.

A plank measures 2 inches thick, 13 inches in width, and 14 feet 6 inches in length—what is its content in board measure?

14 6 length.
1 1 width.

1 2 6'
14 6

15 8 6 content of one side.
2in. thick or twice the content of the one side.

5 0 content in board measure.

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A piece of timber measures 23ft. 4in. in length, 9 inches in breadth—and 4 inches in thickness—what number of feet therein; board measure? *Ans.* 70 feet.

In a plank 3in. thick, 1ft. 6in. wide and 27ft. 9in. long—how many feet board measure?
Ans. 124ft. 10in. 6″.

6 A joist is 14ft. 3in. in length—7in. in width, and 4in. in thickness—how many feet therein?

There are 3 pieces of scantling, each 9ft. 2in. long, 5in. wide, and 3 thick—what quantity in the whole?

How many feet in 4 pieces,—one measuring 12ft. 2in. long, and 6 by 4—another 13ft. 4in. long, and 7 by 3—and the other 9ft 9in, and 7 by 5.

In 12 rafters each 18ft. 7in. long. 6in. wide and 3 thick—how many feet?

NOTE 3. Fire wood, bark, &c. are measured by the cord: a cord is 8 feet long, 4 feet wide, and 4 feet high; and contains 128 solid feet. The length, breadth, and height multiplied together, give the solid feet, which divide by 128; the quotient will show the number of cords.

A solid foot is 1728 solid inches: the inch in the following answers is meant to be the 12th part of a square foot, or 144 solid inches.

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A quantity of wood cut 4ft. being piled up 6ft. 4in. high, and in length 36ft. 8in.—how many cords therein?

Ans. 7 cords 32 solid feet 10in.

A load of bark measures 8ft. 4in. in length, 3ft. 4in. wide, and 3ft. 9in. high, what quantity therein? *Ans.* 104ft. 2in.

In a load of wood 6ft. long, 8ft. wide and 3ft. 6 in. high—how much?

Ans. 63ft. or ½ a cord nearly.

A load of bark is 8ft. long, 4ft. wide, 3ft. 6in. high at one end and 4ft. at the other—what quantity does it contain, and what does it come to at 8 dollars a cord? *Ans.* 120 feet. Price $7, 50.

A quantity of wood cut 4 feet, is piled up at a certain place 13 ft. 4in. high, and in length 65ft. 3in. how many cords are there, and what will it amount to at $5, 25 per cord?

NOTE 4. Quarry-stone is measured by the perch: a perch is 16½ feet long 18 inches wide and 1 foot high, or 24¾ solid feet, or 28512 solid inches.

Some quarrymen make a perch but 15 inches wide.

A pile of stone is 127ft. 10in. long, 48ft. 9in. wide, and 4ft. 4in. high, how many perches does it contain? *Ans.* 1091+ per.

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RULES TO FIND THE CONTENT OF LAND.

1. For any regular square piece of ground, multiply the length in perches, by the breadth; the product is the content in perches, which bring into acres by Reduction.

EXAMPLES.

A field measures 45 perches in length, and 35 in breadth: how many acres therein?

Ans. 9*A.* 3*R.* 15*P.*

A piece of ground 139 perches in length, and 49 in breadth—how many acres therein?

Ans. 42*A.* 2*R.* 11*P.*

—

2. For a triangular or three-square piece of ground: multiply the longest side by half the breadth: the product is the content in perches.

EXAMPLES.

In a three sided piece of land whose longest side is 43 perches, and breadth 24 perches, how many acres? *Ans.* 3*A.* 0*R.* 36*P.*

How many acres in a three cornered field, the longest side of which measures 53 perches, and the breadth 33 perches? *Ans.* 5*A.* 1*R.* 34½*P.*

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The length of the longest side of a triangular field is 54 perches, and its breadth 23; how many acres does it contain?

THE END.



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